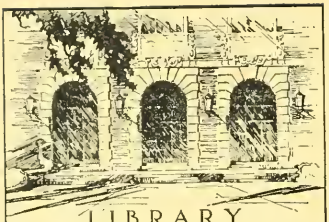


COMMODITY ORIGINS, TRAFFIC AND MARKETS ACCESSIBLE TO CHICAGO VIA THE ILLINOIS WATERWAY

BY

J. EDWIN BECHT

B.S., Southern Illinois University, 1947
M.S., University of Illinois, 1948

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN GEOGRAPHY
IN THE GRADUATE COLLEGE OF THE
UNIVERSITY OF ILLINOIS, 1951

URBANA, ILLINOIS

COMMODITY ORIGINS, TRAFFIC AND MARKETS ACCESSIBLE TO CHICAGO VIA THE ILLINOIS WATERWAY

by

J. EDWIN BECHT

Published by
THE ILLINOIS RIVER CARRIERS' ASSOCIATION
of
Chicago, Illinois

PREFACE

Geography is concerned with the study and analysis of the earth's distribution patterns and with identifying and interpreting the meaningful distributional differences from place to place on the face of the earth. One of the results of such differences in distributions is trade and commerce. An understanding of trade and trade routes is contingent upon a knowledge of various relative resource and use dispositions that are requisite to the production and carrying of economic goods. Thus, in general, the pattern of traffic flow for a transportation artery is a direct result of commodity exchanges between diverse but complementary areas, the existing rate structure and other transfer costs and considerations.

This geographic study deals with the traffic pattern of the Illinois Waterway. Its purpose is to illustrate commodity origins, traffic and markets accessible to Chicago via the Illinois Waterway as determined by applicable geonomic principles and as influenced by certain advantages and limitations inherent in barge transportation. As a strategic link in the Nation's inland waterway system the Illinois Waterway has potentialities as yet unrealized. To what degree its facilities will eventually be used can be ascertained only after the current traffic pattern has been analyzed for its principal terminus, Chicago. More than 80 per cent of all traffic on the Illinois Waterway is transhipped, originated or terminated in Greater Chicago. It is therefore intended that this work will help to make and to validate trend predictions for the entire waterway.

The author wishes to acknowledge with particular gratitude four major

contributions. His wife's unfailing encouragement, patience and assistance have been indispensable; the help of the Illinois River Carriers' Association whose cooperation and material support made the study possible; the statistical records provided by the Corps of Engineers, U.S. Army, and The American Waterways Operators, Incorporated; and the helpful assistance and suggestions received from the faculty and fellow students of the Department of Geography, University of Illinois.

The contributions of the many waterway users, interested companies and individuals are keenly appreciated. These contributors are too numerous to list here but are credited in the footnotes.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

Figure Page

Figure Page

Figure Page

I. INTRODUCTION

Traditional Importance of The Illinois Waterway

The Illinois Waterway is strategically located. The Waterway connects Greater Chicago, which has a population in excess of 7,000,000 and is the nation's second greatest center of production, with the Mississippi River and its network of navigable tributaries, totaling more than 7,800 miles in length (fig. 1). The Illinois Waterway in conjunction with the Mississippi River links together the Gulf of Mexico and the Great Lakes, the latter being joined to the Atlantic Ocean by navigable rivers and canals. Furthermore, the Illinois water route provides low cost transportation between complementary but diverse regions--Industrial Chicago on the one hand; on the other, essential reservoirs of raw materials. Outstanding among such resources of raw materials are: coal, sand and gravel, petroleum products and grain--all of which are accessible to the Waterway within the State of Illinois--and resources of crude petroleum, sulphur, and chemical products--available in the Middle South and along the Gulf Coast.

The record shows the route of the Illinois River long has been known and used by man. Indians had been using the course for centuries prior to 1763, the year Joliet and Marquette crossed the State of Illinois along the valleys of the Illinois, Des Plaines and Chicago Rivers. Fur traders soon followed the explorers, hunter pioneers appeared next in the increasingly complex culture, finally to be succeeded by permanent settlers. The latter came to use the land itself and to establish an economy new to the area.

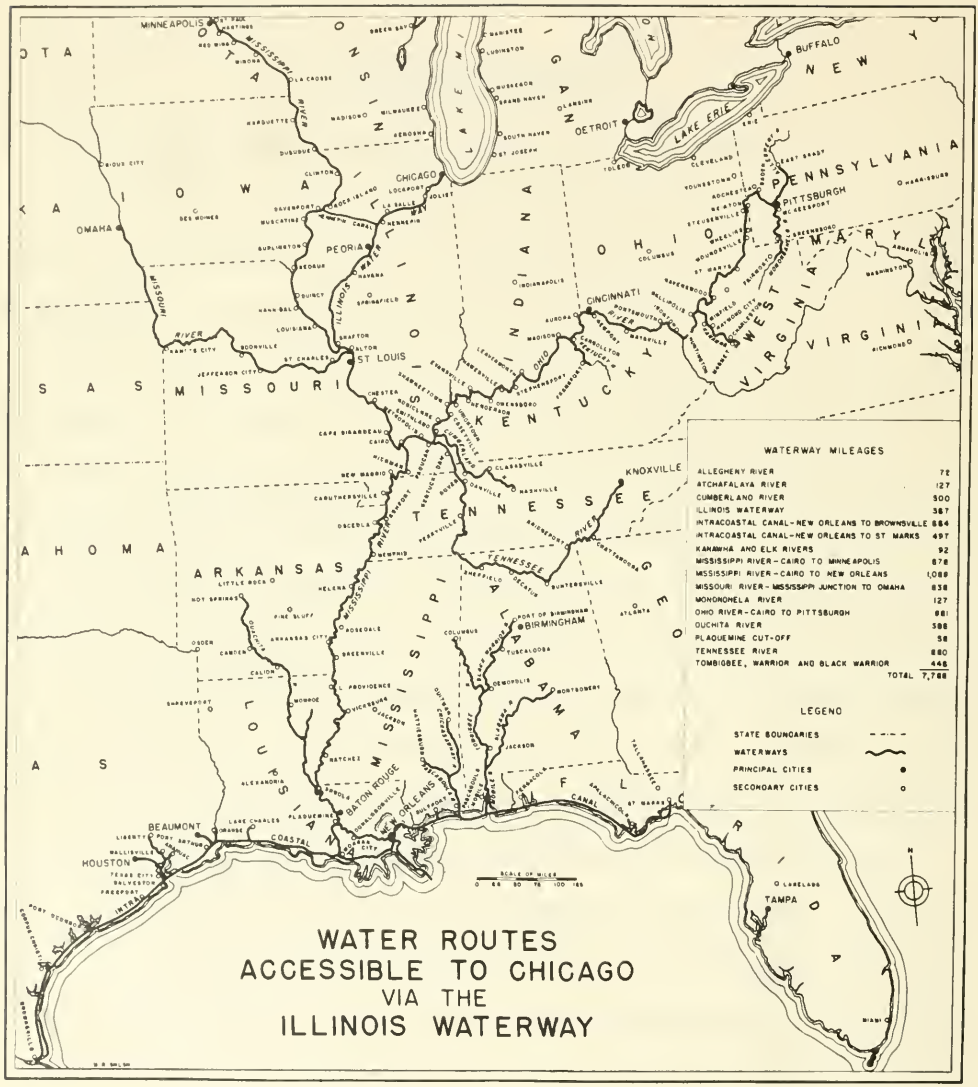

WATERWAY MILEAGES
ALLEGHENY RIVER 72
ATCHAFALAYA RIVER 127
CUMBERLAND RIVER 500
ILLINOIS WATERWAY 327
INTRACOASTAL CANAL-NEW ORLEANS TO BROWNSVILLE 684
INTRACOASTAL CANAL-NEW ORLEANS TO ST MARKS 497
KANAWHA AND ELK RIVERS 92
MISSISSIPPI RIVER-CAIRO TO MINNEAPOLIS 678
MISSISSIPPI RIVER-CAIRO TO NEW ORLEANS 1,088
MISSOURI RIVER-MISSISSIPPI JUNCTION TO OMAHA 838
MONONGAHELA RIVER 127
OHIO RIVER-CAIRO TO PITTSBURGH 981
OUCHITA RIVER 598
PLAQUEMINE CUT-OFF 58
TENNESSEE RIVER 880
TOMBIGBEE, WARRIOR AND BLACK WARRIOR 445
TOTAL 7,766
LEGEND
STATE BOUNDARIES
WATERWAYS
PRINCIPAL CITIES
SECONDARY CITIES
WATER ROUTES
ACCESSIBLE TO CHICAGO
VIA THE
ILLINOIS WATERWAY

Fig. 1

By 1833 permanent settlers had complete control of the land and soon recognized that increased means of transportation were requisite. Thus, the Illinois and Michigan Canal, 100 miles long, came to be constructed from La Salle following the Illinois and Des Plaines Valleys, thence across the low divide to the south branch of the Chicago River (fig. 2). Due to the fact that most settlers in northern Illinois had established themselves near the Illinois River for transportation reasons, such a canal appeared highly satisfactory at its beginning in 1836. Indeed, towns settled along it during the period of its construction (1836-1848) experienced an early growth attributable in the main to canal transportation facilities, excellent for the day. However, even before it was opened for traffic in ~~1858~~ 1848, the early success of railroads and also their planned construction parallel to the canal indicated the canal's use would be short-lived. Such was to be the case and by the beginning of the twentieth century traffic on the canal was negligible.

Since the turn of the century, however, a number of events have led up to a great increase in canal traffic. The transportation crisis of 1906-07, the completion of the Panama Canal and World War I all resulted in renewed interests in the waterways of the Mid-West. The Illinois Waterway was planned and constructed. The channels of the Illinois River and the lower part of the Des Plaines River were deepened and straightened and the Chicago Drainage Canal, which had been built between 1892 and 1900, was improved.

The waterway had been planned as a part of a larger goal, "A Lakes-to-Gulf Deep Waterway". The project had been undertaken following a $20,000,000 bond issue voted by the State of Illinois in 1908. However, the state failed to provide sufficient funds to finish it, and under the River and Harbor Act of

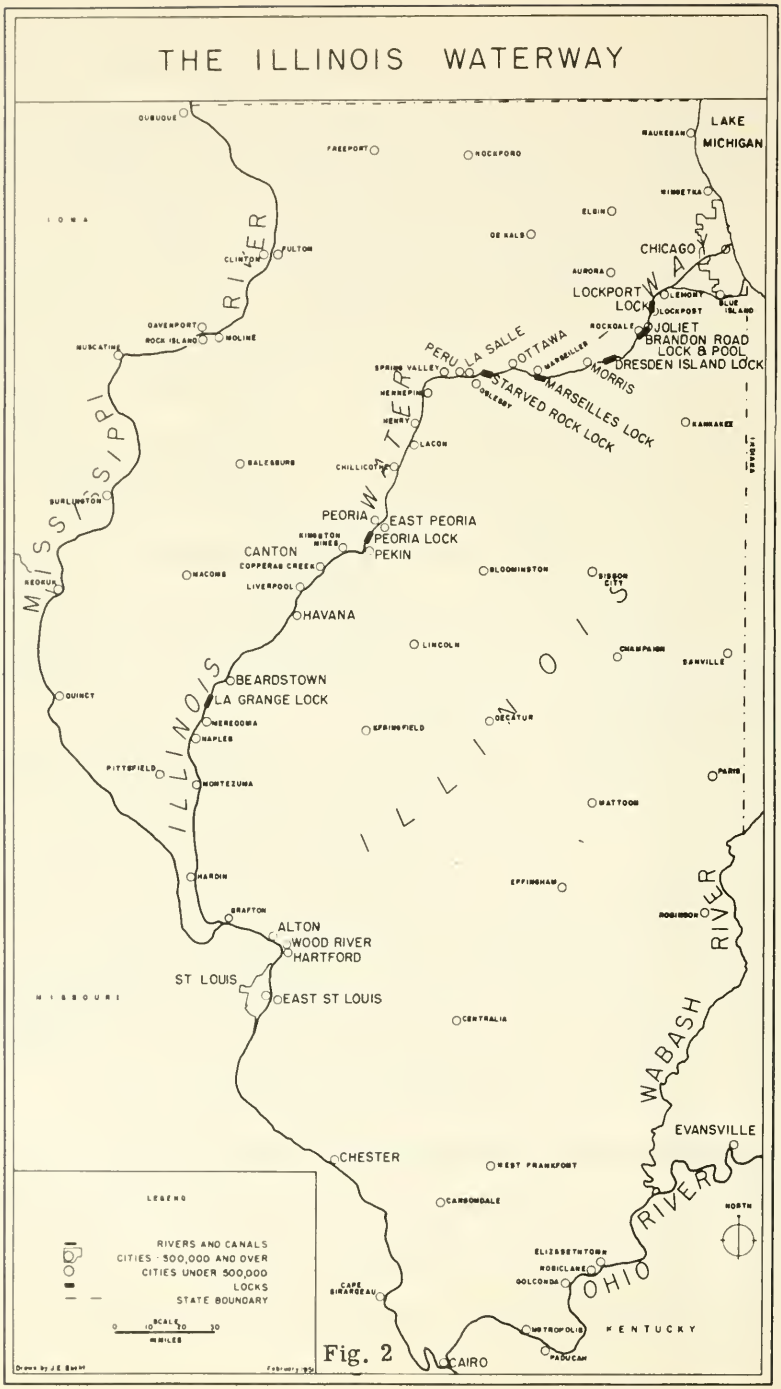

THE ILLINOIS WATERWAY
DUBUQUE
IOWA
CLINTON
FULTON
MISSISSIPPI RIVER
DAVENPORT
ROCK ISLAND
MOLINE
MUSCATINE
BURLINGTON
KEOKUK
QUINCY
MACOMB
GALESBURG
FREEPORT
ROCKFORD
LAKE MICHIGAN
WAUKEGAN
WINNETKA
ELGIN
DE KALB
CHICAGO
AURORA
LOCKPORT LOCK
LEMONT
LOCKPORT
BLUE ISLAND
ROCKDALE
JOLIET
BRANDON ROAD LOCK & POOL
DRESDEN ISLAND LOCK
PERU
LA SALLE
OTTAWA
MARSEILLES
MORRIS
SPRING VALLEY
HENNEPIN
OGLESBY
STARVED ROCK LOCK
MARSEILLES LOCK
HENRY
LACON
CHILLICOTHE
KANKAKEE
PEORIA
EAST PEORIA
PEORIA LOCK
PEKIN
KINGSTON MINES
CANTON
COPPERAS CREEK
LIVERPOOL
HAVANA
BLOOMINGTON
BIGBOB CITY
LINCOLN
CHAMPAIGN
DANVILLE
BEARDSTOWN
LA GRANGE LOCK
MERIDOSIA
NAPLES
PITTSFIELD
MONTEZUMA
SPRINGFIELD
DECATUR
PARIS
MATTOON
ILLINOIS
HARDIN
GRAFTON
ALTON
WOOD RIVER
HARTFORD
ST LOUIS
EAST ST LOUIS
MISSOURI
EFFINGHAM
ROBINSON
WABASH RIVER
CENTRALIA
EVANSVILLE
CHESTER
WEST FRANKFORT
CARBONDALE
ELIZABETHTOWN
ROSICLARE
GOLCONDA
OHIO RIVER
NORTH
CAPE GIRARDEAU
METROPOLIS
KENTUCKY
CAIRO
PADUCAH
LEGEND
RIVERS AND CANALS
CITIES - 500,000 AND OVER
CITIES UNDER 500,000
LOCKS
STATE BOUNDARY
SCALE
MILES

Fig. 2

July 3, 1930 the Federal Government began work on the partly completed water route. In 1933 the first tonnage was recorded and the Illinois Waterway was officially opened in 1935. In the fifteen years since the canal was opened to traffic the tonnage carried on it has increased to more than 12,000,000 net tons annually and indications are that the yearly commodity total will continue to rise.

The most rapid increase in Illinois Waterway tonnages has occurred since the end of World War II. Centripetal forces effecting the location of new industries along the northernmost part of the Illinois Waterway have recently been set into motion. Since the completion of the old Illinois-Michigan Canal in 1848 the waterway has been a potential nucleus for one of the longest and largest industrial districts in the United States; yet, industry failed to align plants there until the current post-war interest in riparian sites. This recent construction is the direct result of a sequence of events occurring since 1945.

This sequence of events has reinforced the effects of certain centripetal forces and has resulted in riparian sites having an increased locational advantage for specific industries.[1] These centripetal forces are: 1) site attraction, 2) functional convenience, 3) functional magnetism, 4) functional prestige, and 5) the human equation.

The first of these, site attraction, has been intensified by the adoption of a new policy by the Chicago Sanitary Canal trustees. Long-term leases are now available whereas conditional sales, or leases of less than five years duration, previously discouraged many companies from utilizing sites along the waterway. Functional convenience, the second of the centripetal forces, has been effected

---

[1]These centripetal forces are similar to those resulting in urbanism, see, Charles C. Colby, "Centrifugal and Centripetal Forces in Urban Geography", Annals of the Association of American Geographers, Vol. 23, March 1933, p.1.

by a 1947 Supreme Court decision in favor of the Mechling Barge Lines over eastern railroads prohibiting discriminatory rate differentials on grain brought into Chicago other than by rail. As this same court ruling will apply to other commodities, it has hastened the day when railroads will ally their interests more fully with that of the river carriers. This is evident by the Indiana Harbor Railroad's attempt to establish industries on a 250 acre strip between their right of way and the canal, a property they have held for many years. Freight movements brought about by this growing interest and activity will result in a heightening of Chicago's "inter-regional position", especially with more goods being transferred from one form of carrier to another. The growth in pre-requisite port facilities alone will cause great changes in the nature and character of transportation. Also, the functional convenience of a location close to the waterway has been intensified by important rate increases allowed the railroads by the Interstate Commerce Commission following World War II, thereby increasing the disparity between rail and water rates. In addition, delays resulting from complicated and time-consuming switching and sorting of rail cars have resulted in a loss of shipping time that partly offsets time lost by slower moving water-borne freight.

The third centripetal force, functional magnetism of industrial sites, along the canal has been increased by the post-war construction of oil refineries and terminals, which has attracted other chemical concerns, and by heavy earth and farm machinery production, which has drawn part and sub-assembly suppliers into the area. In addition, the erection of a $100,000,000 power plant by Commonwealth Edison, based on water-borne coal, makes available electrical energy, and increased grain movement has caused the planning of large food

processing plants. Not only are new manufacturing units expected to attract additional industries but added road and rail facilities, as well as police and fire protection should also contribute to the area's "functional magnetism".

The fourth and fifth centripetal forces, functional prestige and the human equation, are relatively minor points, certainly less tangible. The fourth force has not increased much because what prestige a manufacturer may require can be had through the maintenance of an office in Chicago. The last of the centripetal forces, the human equation factor, can be noticed in the attitudes of shippers. There appears to be a more general recognition that each of the major mediums of transportation--rail, truck, water, air and pipe line--has its place in the scheme of trade and commerce. At least the merits of each are more generally recognized than in the era of complete railroad dominance which now seems to be drawing to a close.

In any event, the increased strength of the centripetal forces at work along the Illinois Waterway from Joliet to Chicago are having far-reaching repercussions. It is evident that one of the most immediate and lasting results will be an increased use, in quantity, as well as variety, of bulk industrial raw materials. It is therefore intended that this dissertation emphasize the accessibility of Greater Chicago to sources of bulk industrial raw materials without omitting considerations of the other commodities currently carried.

Organization

The organization of this paper is based on the premise that there are three logical requirements for existing traffic. They are 1) a functioning transport system, 2) a demanding market with terminal facilities, and 3) accessible supplies of economic goods. On that premise, the character of the waterway,

its traffic carrier organizations and their equipment are treated in Chapter II. In Chapter III Chicago's waterway shippers and riparian facilities, or terminals, are inventoried and the kinds of users are listed and their distributions are mapped.

After the waterway is related to Greater Chicago, the commodity origins, traffic and markets accessible to Chicago via the waterway are shown as governed by principles of water transportation, and the advantages and limitations inherent in barge transportation.

Pertinent appendixes and a "Selected Bibliography" for the basic data used in this study completes the dissertation.

II. THE ILLINOIS WATERWAY

Introduction

In order to understand commodity origins, traffic and markets accessible to Chicago via the Illinois Waterway it is first necessary to visualize the general outline of the traffic pattern, and the cargoes carried. To further broaden the understanding of traffic on the waterway it is requisite to know the types of carriers, their service and their equipment. Following that must come an appreciation of the physical characteristics of the waterway and the nature of the navigational difficulties encountered because these also have a determining influence on the amount and kind of cargoes. This chapter treats these topics in order.

Character and Volume of Traffic

In general, there are two principal market and supply zones that either receive goods from or ship commodities to Chicago by barge via the Illinois Waterway. They are: 1) northern and central Illinois and the St. Louis area of Missouri and 2) the Louisiana and Texas Gulf Coast areas. In addition there are four minor market and supply zones. They are Ohio River ports, ports of the upper Mississippi River, Memphis on the middle Mississippi River, and the Tennessee valley (fig. 1).

Evidence that traffic generated within the market and supply zones for the Illinois Waterway is expanding is found in the records of the Corps of Engineers, U.S. Army (fig. 3). Figure 4 shows the growth of traffic has been rapid and fairly uniform except for the war years and post-war period of 1942 through 1946.

The temporary decline in traffic during the war years of 1943 and 1945 indicates that increased traffic on this transportation route is not a wartime phenomenon but a permanent development.[1] The greatest annual increment occurred in 1947, a year of high production but also a year when indications were the strongest that a more competitive buyers' economy was imminent. This demonstrates the principle that periods of modest market demands favor water transportation.

NET TONS AND TON-MILES CARRIED
ON THE ILLINOIS WATERWAY
1935-1949*

Year	Net Tons	Ton-Miles
1935	1,695,120	146,343,320
1936	2,171,374	174,875,544
1937	3,690,521	325,910,214
1938	4,446,513	393,988,943
1939	5,500,740	597,378,218
1940	5,729,356	761,364,345
1941	6,735,657	943,662,066
1942	6,790,041	945,625,613
1943	6,445,373	925,274,878
1944	7,803,577	1,227,404,740
1945	6,590,939	1,048,789,931
1946	6,913,721	1,087,350,501
1947	10,165,293	1,699,362,963
1948	12,272,945	2,080,711,000
1949	12,895,114	1,963,407,299

*Corps of Engineers, U.S. Army

Fig. 3

The average length of haul is becoming greater. By comparing the rate of growth curves for net tons carried and ton-miles in figure 4 it is noted that the

[1]During World War II -- it should be pointed out -- more than 1,000 combat or transport naval vessels passed through the Illinois Waterway. Most of these were launched at shipyards on the Great Lakes, or at the ways near Seneca, Illinois. Thus, although the total tonnage of goods carried on the Waterway declined during the period 1943-1945, its existence directly benefited the war effort.

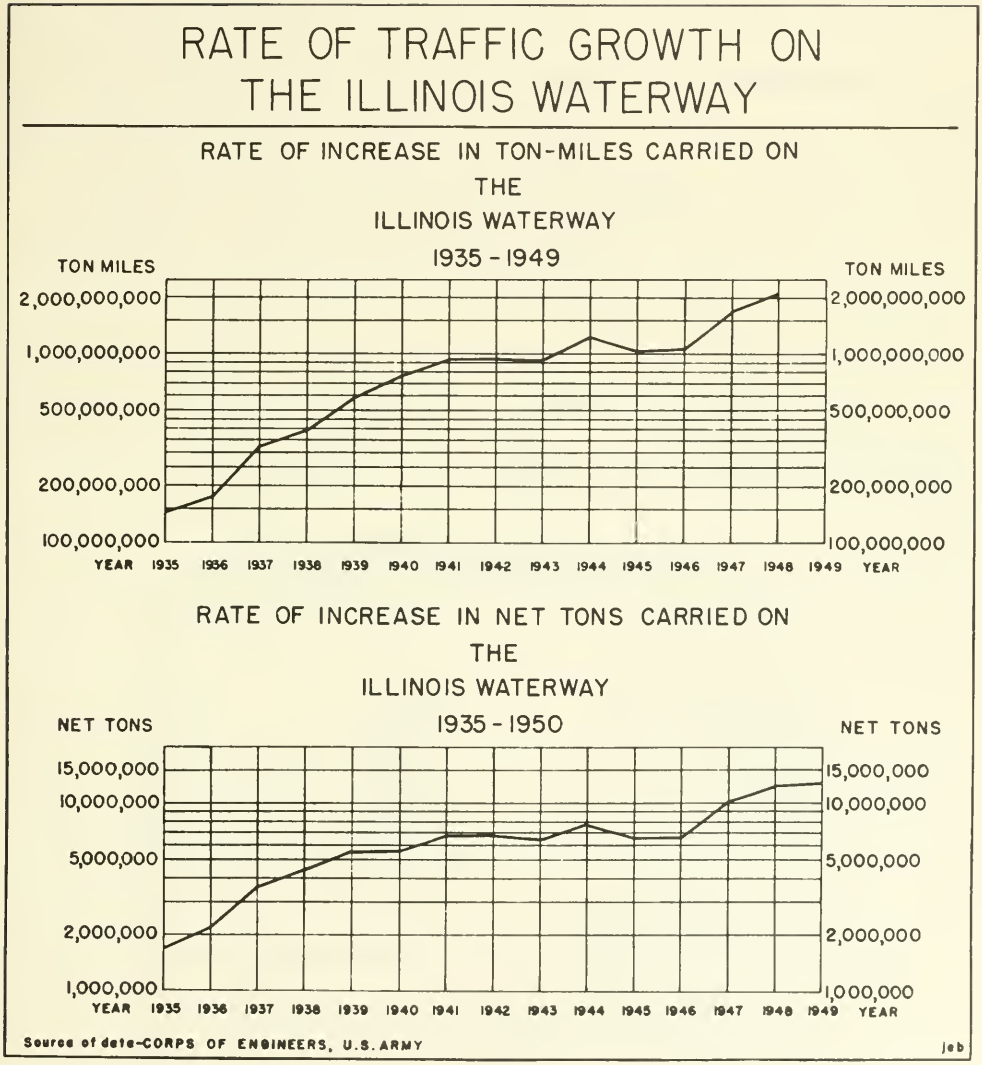

RATE OF TRAFFIC GROWTH ON
THE ILLINOIS WATERWAY
RATE OF INCREASE IN TON-MILES CARRIED ON
THE
ILLINOIS WATERWAY
1935 - 1949
TON MILES
2,000,000,000
1,000,000,000
500,000,000
200,000,000
100,000,000
YEAR 1935 1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 YEAR
RATE OF INCREASE IN NET TONS CARRIED ON
THE
ILLINOIS WATERWAY
1935 - 1950
NET TONS
15,000,000
10,000,000
5,000,000
2,000,000
1,000,000
YEAR 1935 1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 YEAR
Source of data-CORPS OF ENGINEERS, U.S. ARMY
Jeb

Fig. 4

line showing the rate of increase in ton-miles carried rises more rapidly than the line showing net tons (fig. 4). Thus, the current growth of traffic reflects a shift to commodities originating at, or destined for, increasing distances downstream from Chicago.[1]

A preponderance of the tonnage carried on the Illinois Waterway is made up of a few commodities. In order of their importance tonnage-wise the principal products transported over the waterway in 1949 were: bituminous coal, gravel and sand, petroleum products, grain, sulphur, and iron and steel (fig. 5). A large number of commodities, other than these, are also barged but their total tonnage is only an approximate 13 per cent of the total (fig. 5). Further details of traffic characteristics, such as trends, volume, origins, and markets are included in the separate considerations of each commodity.

PRINCIPAL COMMODITIES TRANSPORTED
ON ILLINOIS WATERWAY 1948[a]

Commodity	Net Tons	% of Total
Bituminous Coal	4,011,693	30.1
Gravel and Sand	2,795,050	21.5
Petroleum Products	2,007,641	15.5
Grain[b]	1,523,702	12.0
Sulphur	528,488	4.0
Iron and Steel	335,676	3.0
All others	1,692,853	13.0
Total	12,895,114	100.0

[a]Department of the Army, Corps of Engineers

[b]Soybeans estimated as 200,000 tons. Data from Chicago Board of Trade, Statistical Department.

Fig. 5

[1]Even though the data of figs. 3 and 4 are for the entire Illinois Waterway over 80 per cent of all traffic originates, terminates, or is transhipped along the Joliet-to-Chicago sections.

The movement of traffic is predominantly northbound. Less than 15 per cent of the total is southbound. This means that much empty equipment travels southward at a cost that must be charged to northbound shipments (fig. 6). A more balanced directional pattern of traffic would benefit shippers by making possible lower rates, and this would also strengthen the competitive position of the waterway carriers.

DIRECTION OF TRAFFIC ON THE ILLINOIS WATERWAY, 1942-1947*

Year	Northbound % of total	Southbound % of total	Total
1942	87.6	12.4	100.0
1943	85.6	14.4	100.0
1944	85.7	14.3	100.0
1945	86.0	14.0	100.0
1946	82.6	17.4	100.0
1947	87.3	12.7	100.0

*Corps of Engineers, U.S. Army, Annual Reports to the Chief of Engineers, (Washington, D.C., 1942-1947).

Fig. 6

The Illinois Waterway ranks high among the nation's waterways in net tons carried. Its strategic location, rather than its length, is emphasized by comparing the net tons carried and length with the other major navigable rivers of the United States. In spite of the fact there are eight streams that are longer, (fig. 1) there are only four that carry a greater annual tonnage (fig. 7).

Carriers

There are three types of carriers and operators performing line haul freight service on the Illinois Waterway: 1) common; 2) contract; and, 3) private. Common carriers offer their services to the general public for the transportation

of nearly all[1] kinds of freight at rates and charges published in tariffs on file with the Interstate Commerce Commission. Contract carriers carry freight, mainly bulk commodities, at rates that are not generally published but are

NET TONS OF TRAFFIC ON IMPORTANT INLAND WATERWAYS OF THE UNITED STATES 1949*

System	Net Tons	Rank According to lengt
Allegheny River	3,174,191	10
Atlantic Intra-coastal Waterway	3,736,358	9
Black Warrior, Warrior and Tombigbee System.	2,058,504	12
Gulf Intra-coastal Waterway	27,866,339	4
Illinois Waterway	12,272,945	5
Kanawha and Elk Rivers	5,911,233	6
Mississippi River	57,148,268	1
Missouri River	810,507	14
Monongahela River	30,014,682	3
New York State Barge Canal	4,513,817	7
Ohio River	42,792,487	2
Sacramento River	1,541,508	13
Tennessee River	2,963,264	11
Willamette River	4,169,595	8

*American Waterways Operators, Inland Waterways--Facts and Figures, (Washington, D. C., 1950), pp. 15-18.

Fig. 7

individual agreements between shipper and carrier and vary with the volume and commodity under consideration. Terminal services of a switching nature are usually performed with contract arrangements based on the ton-miles to be hauled. Private carriers usually operate exclusively for a parent organization and carry commodities that are a component part of that company's business. On occasion they will act as contract carriers, but such arrangements are limited by time and certain combinations of conditions. The carriers operating on the Illinois Waterway are given in fig. 8.

[1]The nature of water transportation precludes the transport carrying of some kinds of commodities, see Chapter V.

ILLINOIS WATERWAY CARRIERS OPERATING IN CHICAGO-1950

Class A Common Carriers[a]	Freight Revenue		Net Tons Carried	
	1949	1948	1949	1948
American Barge Line Company, Inc.	$5,639,257	$5,533,471	1,530,738	1,560,260
Central Barge Company	2,459,958	2,395,471	3,386,742	3,861,030
Inland Waterway Corp	8,560,151	8,316,507	2,505,496	2,702,819
John I. Hay Company	2,273,272	2,104,860	601,964	703,906
A. L. Mechling Barge Lines, Inc.	1,853,231	1,409,428	1,424,682	1,078,601
Ohio River Company	3,276,533	3,802,015	4,150,376	5,331,348
Class B Common Carriers[a]				
Blaske Lines	623,746	550,788	600,752	590,299
Marine Transit Company	662,553	408,448	859,313	554,605

Contract Carriers[b]	Private Carriers[b]
Acme Petroleum Company	Avondale Refining Company
Capt. E. T. Bull	A. J. Harrna
Cargo Carriers, Inc.	Illinois Farm Supply Company
Chicago Towing Company	International Harvester Company
Jas. A. Harrnah, Inc.	Marquette Cement Manufacturing Company
Ernst W. J. Seip	Martin Oil Service Company
	Material Service Corp.
	Pure Oil Company
	Standard Oil Company
	The Texas Oil Company
	Universal Atlas Cement Company

[a]Data for 1949 and 1948, Interstate Commerce Commission, Selected Financial and Operating Statistics From Annual Reports of Carriers By Inland Waterway and Coastal Waterways and Maritime Carriers, Years Ending 1948 and 1949 (Washington Government Printing Office, 1949 and 1950)--Class A Carriers average annual operating revenues exceeding $500,000--Class B Carriers average annual operating expenses exceeding $100,000 but less than $500,000.

[b]Interstate Port Handbook, 1949, Rockwell F. Clancy Company, Chicago, 1949, p. 56.

Fig. 8

Most of the operators attempt to specialize in one type of commodity. For example, the two carriers hauling the most tonnage tend toward coal cargoes. The Inland Waterway Corporation, more commonly referred to as the Federal Barge Lines, the John I. Hay Company and The American Barge Lines Company carry a great variety of commodities and attempt to build up ton-miles by long hauls--i.e., to points along the Gulf Coast or to the Pittsburgh area. A. L. Mechling Barge Lines, Incorporated concentrates on moving grain and petroleum products. The Marine Transit Company specializes in grain, sand, coal, pig iron, scrap and rock and limits its operations to a comparatively short haul; that is, to points above St. Louis. The Blaske Lines, Incorporated is predominantly a transporter of coal and grain, although, like the Marine Transit Company, it is less specialized than the two larger coal carriers.

All of the common carriers operate outside of the state of Illinois. However, the American Barge Lines, Incorporated handles only interstate traffic. Exclusion from intrastate hauling is not as severe a handicap as at first might seem to be the case, because this company's chief source of revenue is from cargoes on the Ohio River,[1] and, as indicated above, it specializes in the "long-haul".

The only carrier that solicits carload or less than carload lots of freight is the Inland Waterway Corporation. Bargeload traffic is most economical to shippers and is preferred by the carriers. Subsidized by the Federal Government, The Inland Waterway Corporation has pioneered in the development of the present rate structure and it is currently engaged in establishing an express service between Chicago and New Orleans with only one stopping point--St. Louis.

---

[1]Statement by Edward J. Vaughan, American Barge Lines, Inc., personal interview.

This service is intended primarily for less than carload lots of freight. The movement of such tows are scheduled to provide a transit time of $6\frac{1}{2}$ days from Chicago to New Orleans, and $10\frac{1}{2}$ days from New Orleans to Chicago. Even with this express service an average elapsed time of three weeks is experienced by shippers, the additional time being accounted for by loading, unloading and drayage from dock to plant.[1]

The various carriers providing service on the Illinois Waterway have developed excellent transport equipment. Towboats are of varying sizes and power according to the capacity of the waterway in which they are intended to be used. Barges are constructed to serve one of three classes of commodity; they are 1) dry bulk, 2) liquid bulk, and 3) general cargo. The different kinds of equipment available and their characteristics are treated in detail in Appendix A.

Physical Characteristics

Although the effective supply and market areas covered in this study include all origins and destinations of commodities carried, the part of the Illinois-Mississippi Waterway considered in detail in this study is 327 miles long, and extends from Lake Michigan to the Mississippi River at Grafton (fig. 2). The Peoria and New La Grange locks built in 1936 and 1938, respectively, completed the construction of the waterway as it exists today. A minimum depth of nine feet is maintained for navigation by seven locks 110 feet wide and 600 feet long,[2] capable of handling 10,000 ton tows consisting of ten "standard" barges and a towboat.

The thirty-six miles section of the waterway extending from the locks at

---

[1]Average figure given by 32 traffic agents, personal interviews, and letters.

[2]Corps of Engineers, U.S. Army, "Charts of the Illinois Waterway", Office of the District Engineer, Chicago, Illinois, 1948.

the mouth of the Chicago River to Lockport (fig. 2) is made up of the Chicago River, the South Branch of the Chicago River, and the Chicago Sanitary and Ship Canal. This section traverses the metropolitan area of Chicago, and numerous bridges crossing it--many of them outmoded, having been built over forty years ago--precludes its use by large river craft. An alternate route to Lake Michigan, constructed in 1922 for sewage disposal, branches from the main canal just above Lemont (fig. 9). With a controlling width of only fifty feet and 16 miles long, the Sag Channel connects with the Lake via the Little Calumet River, 13 miles long. This section is narrow with sharp turns and is difficult to navigate. At Lockport the waterway follows the Des Plaines River to its confluence with the Kankakee to form the Illinois River. All the way to Ottawa--94 miles--canalization has been performed, construction ranging from a retaining wall at Joliet to blasting through rock at numerous points between Brandon Road Locks and Ottawa.

In the 64-mile section between Lockport and Starved Rock the waterway drops 137 feet through a series of five locks (fig. 2). The immediate difference in water level at each lock varies from 40 feet at Lockport to 18.5 feet at Starved Rock. In the remaining 232 miles to the Mississippi the Illinois River drops only 23 feet at low water stages. Just south of Peoria and eight miles south of Beardstown, movable dams maintain a nine foot channel during periods of low water. For periods of high water the dams are lowered and tows proceed without stopping.

Navigation Difficulties

Differing capacities for accommodating shipping along the Illinois-Mississippi Waterway has resulted in an operating procedure referred to as "turning

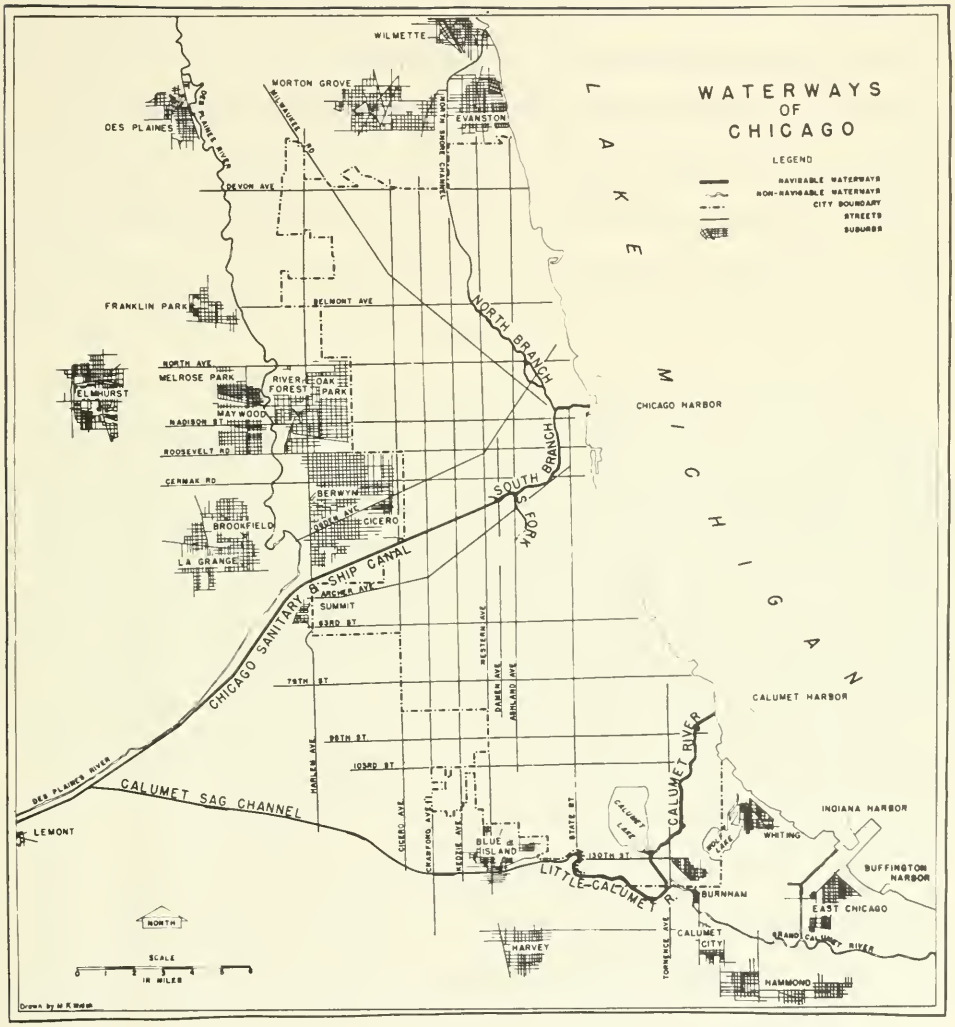

WATERWAYS
OF
CHICAGO
LEGEND
NAVIGABLE WATERWAYS
NON-NAVIGABLE WATERWAYS
CITY BOUNDARY
STREETS
SUBURBS
LAKE MICHIGAN
WILMETTE
MORTON GROVE
EVANSTON
DES PLAINES
DES PLAINES RIVER
MILWAUKEE RD
NORTH SHORE CHANNEL
DEVON AVE
FRANKLIN PARK
BELMONT AVE
NORTH BRANCH
NORTH AVE
MELROSE PARK
RIVER FOREST
OAK PARK
ELMHURST
MAYWOOD
MADISON ST
ROOSEVELT RD
CHICAGO HARBOR
CERMAK RD
BERWYN
CICERO
SOUTH BRANCH
SOUTH FORK
BROOKFIELD
LA GRANGE
CHICAGO SANITARY & SHIP CANAL
ARCHER AVE
SUMMIT
93RD ST
WESTERN AVE
DAMEN AVE
ASHLAND AVE
79TH ST
CALUMET HARBOR
98TH ST
103RD ST
CALUMET RIVER
DES PLAINES RIVER
CALUMET SAG CHANNEL
HARLEM AVE
CICERO AVE
CRAWFORD AVE
KEDZIE AVE
BLUE ISLAND
STATE ST
CALUMET LAKE
INDIANA HARBOR
WHITING
LEMONT
130TH ST
BUFFINGTON HARBOR
LITTLE CALUMET R.
BURNHAM
EAST CHICAGO
CALUMET CITY
GRAND CALUMET RIVER
TORRENCE AVE
HARVEY
HAMMOND
NORTH
SCALE
0 1 2 3 4 5
IN MILES
Drawn by M.R. Welch

Fig. 9

the tow".[1] On the basis of capacity to carry traffic, the Illinois-Mississippi Waterway can be divided into three sections. These are the stretches between 1) Chicago and Brandon Pool, immediately to the south of Joliet, 2) Brandon Pool and Peoria, and 3) Peoria and the Gulf of Mexico (fig. 2). Narrow, crooked, shallow waters and frequent outmoded, low bridges above the Brandon Pool necessitate use of small towboats of less than 1200 horsepower, the larger of these having telescoping pilot houses. In the second section a rock stream bed, a fairly narrow channel (200 feet), and numerous locks preclude an efficient use of the most powerful towboats; so that craft of approximately 1400 horsepower--

---

[1]The larger carriers, those operating fleets of river craft, adjust their operations to these physical limitations in order to derive the greatest possible speed and efficiency from their power units. They arrange for "switcher towboats" to assemble barges in the rivers and canals of Greater Chicago and move them in tows to Brandon Pool (fig. 2). At this point larger "pushers" meet them with barges bound into Chicago and here they exchange tows, this is the "turning of the tow" mentioned above; then, the smaller towboats return to Chicago with their inbound cargoes and the larger vessels push their newly acquired burden southward. The process is repeated when the largest towboats are encountered, usually somewhere between Cape Girardeau, Missouri and Peoria, Illinois, as they bring their tows toward or into the Illinois River.

Brandon Pool is, in addition, a limiting point in that north of this point tows are limited to three or four barges in the Sanitary and Ship Canal and to only two or three in the Sag Channel. On the other hand, the average tow south of Brandon Pool consists of eight cargo units. Therefore, as northbound tows must be divided, and southbound tows consolidated at Brandon Pool, it serves as a logical point for "turning tows".

Towboats do not necessarily meet at an exact location. Rather an accordion-like movement provides a flexibility that allows for delays, due to weather, accidents, stage of water or characteristics of the cargo. The towboats keep their barges moving until the oncoming tow is encountered and an exchange is then made. On occasion, however, narrow sections of the waterway are avoided. If radio contact has indicated two towboats might rendezvous along an especially disadvantageous part of the route, one of the towboats will wait at a more convenient stretch. Furthermore, not all companies operate alike. No provision is made for "turning" small petroleum tows, nor do grain and sand towboats making a short haul from Illinois points to Chicago "turn tows". Likewise coal loads are usually divided only once, at Brandon Pool. However, carriers traveling the longer-haul, to New Orleans or to Pittsburgh, do practice a double "turning of tows". The Inland Waterways Corporation express service is an exception in that they exchange but once between New Orleans and Chicago, primarily in order to save time.

--diesels--are typical. The largest towboats normally ascend the waterway only to the vicinity of Peoria. Some of these, as has been pointed out, are 3600 horsepower giants, over 160 feet long.

The operation known as "turning the tow" is an essential part of the "switching operations" requisite to the orderly receipt of inbound waterway cargoes and the dispatch of outbound barge consignments for Chicago. The development of this operation was an important step in providing water transportation between the two complementary regions, Industrial Chicago, on the one hand, and essential vast reservoirs of coal, petroleum products, building materials, grain and chemical products on the other.

Other handicaps and limitations of towboat operation are encountered on the Illinois Waterway in addition to differing traffic capacities of the waterway. The outstanding difficulties experienced by carriers operating towboats on the waterway and the percentage of total operating time lost due to them are: 1) lock repairs, 14.4 per cent,[1] 2) ice and winter conditions, 9 per cent, 3) congestion at locks, 7.6 per cent,[2] 4) fog, 3 per cent, and, 5) high water, 2 per cent.[3]

The locks are all more than thirteen years of age and require occasional repairs. Also, the Army Engineers are now in the second year of a seven-year program to make a major overhaul of each of the locks. Annually, during the months of January and February, a set of locks is to be shut down completely for a period of six weeks for "preventive maintenance". In 1950 it was the Lockport locks, in 1951 the Brandon Road locks, scheduled for 1952 is the

---

[1]Based on six week closing of one lock annually plus time lost due to normal recurrent repairs.

[2]Based on time lost waiting and does not include time actually engaged in locking operations.

[3]Alba, op.cit., personal interview.

Dresden set of locks and so on downstream until all seven will have been repaired.

Navigation on the Illinois Waterway is normally open the entire year--except for major lock repairs. Each winter, fields of floating ice affect opening, and sometimes even closing, of the locks. Also, anchor and frizzle[1] ice impede progress of tows but nevertheless tows usually get through without long delays. However, in 1948 and again in 1951 it was necessary to resort to ice-breaking operations (fig. 10) and delays of more than two weeks were experienced in shipments, over and above delays incurred under average winter conditions.[2]

Fig. 10.--Ice Breaking operations in 1948, Bulls Island Cut-off. Note sharp prow affixed to front of the nearest barge.--Courtesy T. Jamison, John I. Hay Co.

---

[1]Anchor and frizzle ice is that ice that freezes to the barge, increasing its weight and water resistance.

[2]Statement, Ted Jamison, Pilot, John I. Hay Company, personal interview.

Ice hinders navigation in the main channel only between Peoria and the confluence of the Kankakee and Des Plaines Rivers.[1] Below Peoria ice floes frequently impede navigation but the depth of the water and a milder climate preclude the formation of a thick ice cover. However, in slips, chutes and adjacent lakes ice does constitute a factor limiting winter operations.[2] Above the confluence of the Kankakee and Des Plaines industrial waters and sewage disposal maintain a temperature above the freezing point.[3]

Congestion at locks is an important factor limiting navigation on the Illinois Waterway (fig. 11). The financial loss due to these periods of waiting on the part of towboats and tows is considerable (fig. 12). For example, the 520 towboat working hours lost by the A. L. Mechling Barge Company when translated into dollars amounted to $35,520 or about 8 per cent of the company's grain revenue in 1948 (fig. 8).[4] This figure is obtained by adding freight revenue lost on their grain traffic alone to the "out-of-pocket" expense. It should be pointed out that congestion at the locks, though still costly, might not result in a corresponding loss for the balance of that company's freight revenue as the remaining non-grain freight could have been based on ton-miles established over a longer haul; thus, not necessitating as frequent use of the seven Illinois Waterway locks as the short-haul movement of Illinois grain to the Chicago market. However, losses similar to those encountered in the Chicago grain traffic would be experienced more nearly "across the board" by the specialized large coal carriers

---

[1]Statement, L. D. Alba, op.cit., personal interview.

[2]Statement by Roy Eaton, Traffic Manager, Keystone Steel and Wire Company, Bartonville, Illinois, personal interview.

[3]Alba, op.cit.

[4]Statement by A. L. Mechling Barge Company to Corps of Engineers, U.S. Army, Chicago, Illinois, August 9, 1949.

HOURS LOST WAITING FOR LOCKS ON THE ILLINOIS WATERWAY -- 1948[a]

Month	Lock 80.2	Lock 157.7	Lock 231.0	Lock 244.6	Lock 271.5	Lock 286.0	Lock 291.0	Total Hours Lost Per Month
January	1:35	--	5:30	--	2:45	5:10	6:10	21:10
February	--	--	--	4:00	--	1:50	2:30	8:20
March	--	--	2:15	2:45	3:10	13:25	7:30	29:05
April	--	--	4:30	3:30	:30	1:40	8:15	18:25
May	--	--	1:30	5:25	1:20	7:05	18:00	33:20
June	--	1:05	2:30	2:55	6:30	6:45	12:40	32:25
July	--	1:00	1:00	3:00	3:05	5:25	17:00	30:30
August	1:25	2:50	2:45	2:50	4:05	6:50	27:00	47:45
Sept.	2:00	:45	1:35	5:25	3:05	8:15	34:45	55:50
Oct.	2:15	5:45	3:45	:30	5:10	13:35	25:30	56:30
Nov.	1:15	1:45	3:30	4:00	5:40	10:45	23:40	50:35
Dec.	:10	1:15	3:20	2:25	9:40	10:35	7:30	34:55
Total	8:40	14:25	32:10	36:45	45:00	91:20	190:30	418:50

Hours Waiting Lock during 1948	418 5/6
Average ton miles per boat per hour during 1948	9,840
Ton miles lost in terms of time waiting locks during 1948 . . .	4,121,320

[a]Statement by Inland Waterways Corporation to Corps of Engineers, U.S. Army, August 9, 1949.

Fig. 11

LOCK DELAYS - 1948
TIME LOST OVER AND ABOVE ORDINARY LOCKING TIME[a]

Boats Engaged in Illinois River Grain Trade				
Boat	Time Engaged in Grain Trade	Hours Lost	Cost Per Hour to Operate Boat	Out-of-pocket Loss on Boat Expenses
Donna Lee	2½ Mos.	29	$18.00	$522.00
Patsy H.	8 Mos.	147	16.00	2,352.00
Mary Ellen	12 Mos.	194	12.00	2,328.00
Alyce Mae	7 Mos.	90	14.00	1,260.00
Various boats	Various times	60	16.00(avg.)	960.00
Total		520		$7,522.00

[a]Statement by A. L. Mechling Barge Lines, Inc. to Corps of Engineers, U.S. Army, August 9, 1949.

Fig. 12

who receive more than 90 per cent of their revenue from ton-miles of coal[1] forced to pass through the upper six locks of the waterway. In this connection, it should be pointed out that congestion becomes progressively more severe as a towboat approaches Chicago (Fig. 11).

Fog, especially during late fall, winter and early spring, results in frequent shipping delays. Air warmed at the surface of the water has an increased capacity for water vapor. Thus, when the warmer air rises, or is forced to rise by a passing tow, into colder layers of air above, it is cooled below its dew point and condensation results in low fogs, commonly referred to as vapor fogs. U.S. Weather Bureau records do not indicate accurately the frequency or duration of these periods of little, or no, visibility. Often the phenomena occur during periods of brilliant sunshine (fig. 13). On other occasions a "cloud" will enshroud the forward end of a tow hampering visibility on an otherwise clear night. Figure 13 illustrates this point. The photograph was made at 8:10 A.M. of October 21, 1950, looking down the Sanitary and Ship Canal, to the southwest, from the Harlem Avenue bridge on the outer edge of Chicago. Planes at the Chicago Midway Airport, less than a mile and one-half from the canal, were taking off and landing in clear weather. The official weather records state the ceiling was unlimited and visibility between four and five miles.[2] While radar has cut down loss of time on the broad lower reaches of the Illinois River and on the Mississippi and Ohio Rivers, it has not proved successful in the narrow, crooked channels of the Illinois Waterway above Peoria Lake.

---

[1]Statement by A. M. Thompson, Central Barge Company, personal interview.

[2]U.S. Department of Commerce, Weather Bureau, Station WBAS, Chicago, Illinois.

Fig. 13--Vapor fog restricting visibility on the Sanitary and Ship Canal. At the Chicago Midway Airport less than one and one-half miles distant ceiling was unlimited, no cloud cover and visibility between four and five miles.

Summary

Serving Chicago and connecting the Great Lakes and Mississippi River systems, the Illinois Waterway is strategically located. Currently the Illinois Waterway provides a medium of transport for more than 12,000,000 tons annually and its traffic has continued to increase in spite of handicaps and limitations inherent in the waterway as it now exists. The principal commodities moved are coal, sand and gravel, petroleum products, grain and sulphur. Twenty-five operators, common, contract and private, with a wide range of essential floating equipment have an established system of tariffs and rates. Thus, today, we find the Illinois Waterway an important traffic artery fixed to the largest transportation hub of the nation--Chicago.

III. RELATION OF CHICAGO WATERWAY TO INDUSTRIAL DEVELOPMENT

Introduction

The traffic patterns of the Illinois Waterway include the dispersal, or collecting, of cargoes within Chicago, therefore it is integral to describe the location and type of barge terminals in that city. It is through these terminals that the commodities of river-canal traffic make contact with Chicago users. Also, such a discussion will indicate the accessibility of the waterway to current or potential users; and, in addition, their types and distribution will provide an important part of the entire traffic pattern.

The limitations of current terminals or of future construction may be a deciding factor in predicting possible traffic trends for the waterway. The availability of riparian sites for present industrial use, and the possibility that planned waterway improvements will result in additional industrial locations directly on the waterway are important considerations in establishing the character of future commodity movements.

For these reasons Chicago Waterway terminals and their future development are treated in this separate chapter.

Terminals

Waterway terminals fall into two categories, those operated by river carriers and terminal companies and those operated by riparian industries. More than three-fourths of the total tonnage of all commodities originates, or terminates,

at the docks of manufacturing concerns situated along the waterway. The remainder originates or terminates at docks of carriers and of terminal companies.[1] The fact that the original planners of the Illinois Waterway did not foresee the need for numerous terminals aligned strategically along the water route has resulted in much confused thinking and in considerable sums of money being ill-spent. Early planners envisioned a single huge terminal, over three miles long, extending along the canal from Cicero Avenue in the east to Harlem Avenue in the west. Furthermore, the adjacent segment of the old Illinois-Michigan Canal was to be widened and deepened, and inter-connecting channels were to be dug (fig. 14).[2] Such a terminal would violate two principles of water transportation currently held. The first principle is that barge operations afford the greatest economies when their loading, or unloading, forms an integral part of a plant process. This eliminates costly transhipments of great volumes of low-cost bulky goods and also permits a longer use of the barge for storage. The second applicable principle characteristic of barge transportation is that it has a limited degree of flexibility. Therefore, water carriers have encouraged the construction of numerous terminals at strategic locations and the installation of equipment for loading and unloading at each riparian industrial plant, rather than attempting to channel cargoes through one large depot which would only further limit the flexibility of the waterway.

The major industrial zones of Chicago are traversed by the waterways (fig. 15). The largest zone extends southwest from Chicago's loop area along

---

[1]Statement by Stanley Huggett, Jr., North Pier Terminal Co., personal interview.

[2]Hugh E. Young, Thomas G. Pihlfeldt, and Martin W. Oettershagen, "Waterway Developments, Barge Terminals and Bridge Clearance, Chicago District", Commissioner of Public Works, Chicago, 1932, p.53.

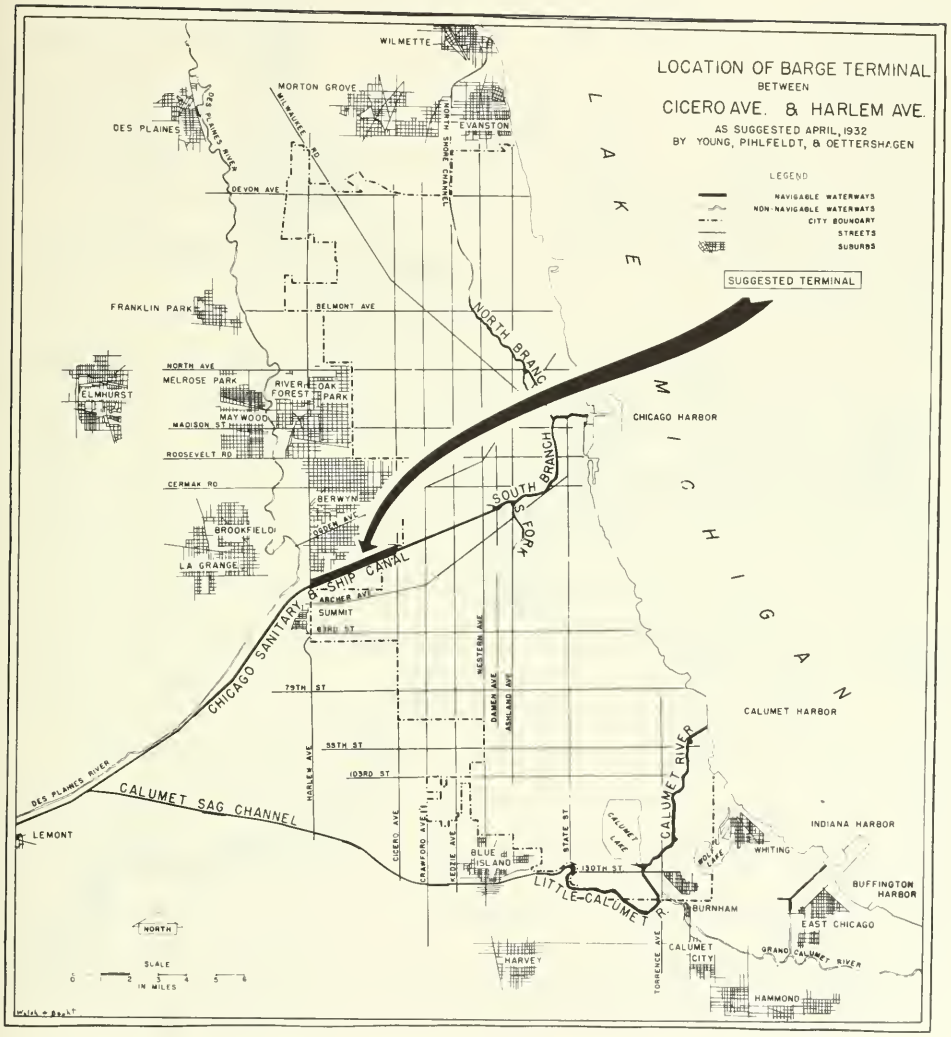


Fig. 14--Single gigantic terminal as proposed by Young, Pihlfeldt, and Oettershagen in 1932.

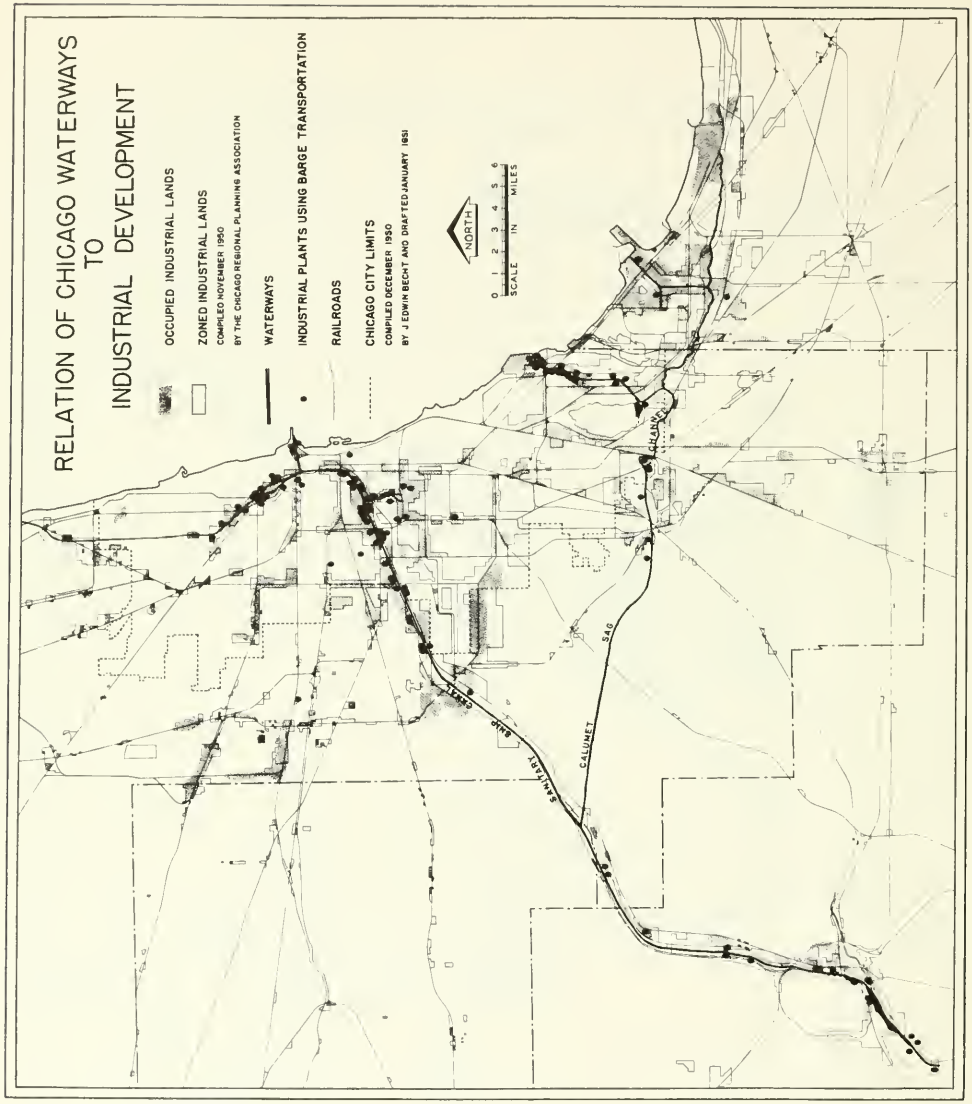

RELATION OF CHICAGO WATERWAYS
TO
INDUSTRIAL DEVELOPMENT
OCCUPIED INDUSTRIAL LANDS
ZONED INDUSTRIAL LANDS
COMPILED NOVEMBER 1950
BY THE CHICAGO REGIONAL PLANNING ASSOCIATION
WATERWAYS
INDUSTRIAL PLANTS USING BARGE TRANSPORTATION
RAILROADS
CHICAGO CITY LIMITS
COMPILED DECEMBER 1950
BY J EDWIN BECHT AND DRAFTED JANUARY 1951
NORTH
SCALE IN MILES
0 1 2 3 4 5 6
CHANNEL
CALUMET
SAG
SANITARY
SHIP
CHICAGO

Fig. 15

the South Branch of the Chicago River and the Sanitary and Ship Canal. The second zone in extent is that centered on the Calumet River (fig. 15). A smaller zone of industry is centered on the North Branch of the Chicago River. Figure 15 also illustrates that the largest areas zoned for future industrial building are either adjacent to the two major waterway arteries, or along the south shore of Lake Michigan with access to barge transportation via the lake.

The fact there are relatively few shippers not located directly on the waterway is indicative of one of the limitations of water transportation, due to the excessive cost of transhipping. The barge industry recognizes this disadvantage and considers twenty-five miles the maximum distance most commodities may be economically trucked to and from the water's edge, and still allow the barge-truck total to compete with rail rates.[1] Chicago is therefore fortunate in having an extensive system of canalized waterways providing not only more frontage but also placing nearly all sections of Greater Chicago within twenty-five miles of barge transportation. Actually no regular large industrial user is more than nine miles from either a navigable canal or river.

That most waterway users are located directly along the waterway is evidenced by the distribution pattern of Chicago's barge shippers (fig. 15). Many plants are currently being located immediately on the waterway because of the advantages of barge transportation. However, the riparian factories or mills of many river-canal users were built prior to the completion of the Illinois Waterway; initially, they may have been so located because industrial water was available from the river, or because of some other favorable factor of industrial location. Therefore, their use of water transportation is a consequence of location.

---

[1]Statement by John O. Innes, John I. Hay, Co., personal interview.

The number of any one kind of terminal in relation to the total is determined by the kind of product handled through it. This is true because each industry has unique requirements of terminal location and these peculiarities, rather than volume alone, determine the distribution of barge loading and unloading points. Petroleum and building material industries have the greatest number of terminals, 21 for petroleum and 21 for building materials make up 35 per cent of the total number of terminals, 120. These two types of terminals are followed in number by grain elevators and processing plants, barge company terminals, iron and steel manufacturers, power plants, chemical producers and coal distributors (fig. 16).

ILLINOIS WATERWAY TERMINALS IN CHICAGO
BY
KIND OF INDUSTRY AND TYPE OF PRODUCT HANDLED

December 1950			
	No. of Terminals		
Industry	Active	Not Active	Commodities
Petroleum	21	1	Petroleum products
Building Materials	21	1	Stone, gravel, sand, coal*
Grain Elevators and Processing Plants	14	0	Grain
Terminals and Warehouses	10	6	Bulk freight: sulphur, paper, sugar, coffee, etc.
Iron and Steel	8	0	Fabricated and semi-fabricated iron and steel, fluorspar, coal (power and heating).
Electric Generating Plants	7	0	Coal
Chemical Plants	6	0	Sulphur, alcohol, phosphate, acids
Coal Companies	6	2	Coal
Miscellaneous	27	8	Coal, cement, paper, groceries, etc.
Total	120	18	

*Not included under coal companies.

Fig. 16

The high number of petroleum and building material terminals is a result of the highly competitive aspects of those industries. Thus, problems of a "blanketing type of distribution"[1] make it advantageous for oil companies to have bulk plants or bulk accounts in several strategically located handling terminals for purposes of trading with other distributing plants. This is done in order to increase the size of their areas of profitable operation.

Building material unloading points are equally numerous because high transportation costs in relation to the value of commodity handled make competitive price zonation a real concern in the industry. Low cost barge transportation is used for sand and gravel for as much of the distance enroute to the consumer as possible. Sand and gravel terminals are so located as to service the entire Chicago market by the shortest possible truck hauls and supplemented by as few rail- and truck-supplied inland centers as possible.[2] Grain elevators are next in number, with two of those so classified having processing units as part of the plant. Current grain marketing operations necessitate bulk storage. Here again the competitive positions of grain brokers controlling riparian elevators is considerably stronger than those limited to inland activities. This factor has resulted in much elevator construction since World War II. The large riparian elevators are located so as to have access to lake, rail, and truck as well as barge transportation.

Terminals operated by the various barge operators and forwarding concerns handle a greater variety of goods than are loaded or unloaded by individual

---

[1]"Blanketing type of distribution" means the marketing of a product so as to place it within easy access of as many buyers as possible inside a given area, i.e., automobile service stations.

[2]Statement by Arnold Sobel, Material Service Corporation, personal interview.

industrial plants. Because the former handle a variety of goods and tranship to inland points, good truck and rail accommodations are essential. Also, they must be situated along water sufficiently deep to float lake boats in order to tranship from barge to lake vessel or vice versa. Another requirement of a good barge terminal is a capacious warehouse. Many shippers use the waterway only because the storage function thus provided is advantageous to their operation, and a large storage space enables the carrier to provide warehousing service at a convenient transhipping point, thereby extending the in-transit storage period. Terminal warehouses also increase the number of potential users for, as previously pointed out, only the large companies are able to provide storage space for even one small standard barge of 1000 tons capacity.[1] Therefore this service permits concerns lacking storage space to use low-cost transportation and still receive uniformly small consignments trucked, or railed, to their plants.

Four of the more strategically located terminals for the handling of miscellaneous merchandise are those operated by the North Pier Terminal Company at Western Avenue and the Canal; John I. Hay Company, at Robinson Street and the Canal; Lake-River Terminals, Incorporated at Harlem Avenue and the Canal; and Calumet Harbor Terminals, Incorporated at the southern end of Lake Calumet (fig. 17). All, except Lake-River Terminals, Incorporated, have water sufficiently deep for lake vessels.

The first two, North Pier and John I. Hay, are situated near the center of the large zone of industries on Chicago's near southwest side. From both, railroad spurs lead to the Chicago Junction Railroad, and, in addition, the North Pier Terminal Company has access to the Chicago, Burlington and Quincy Railroad

[1]Statement by Roy Eaton, Traffic Manager, Keystone Steel and Wire Co., personal interview.

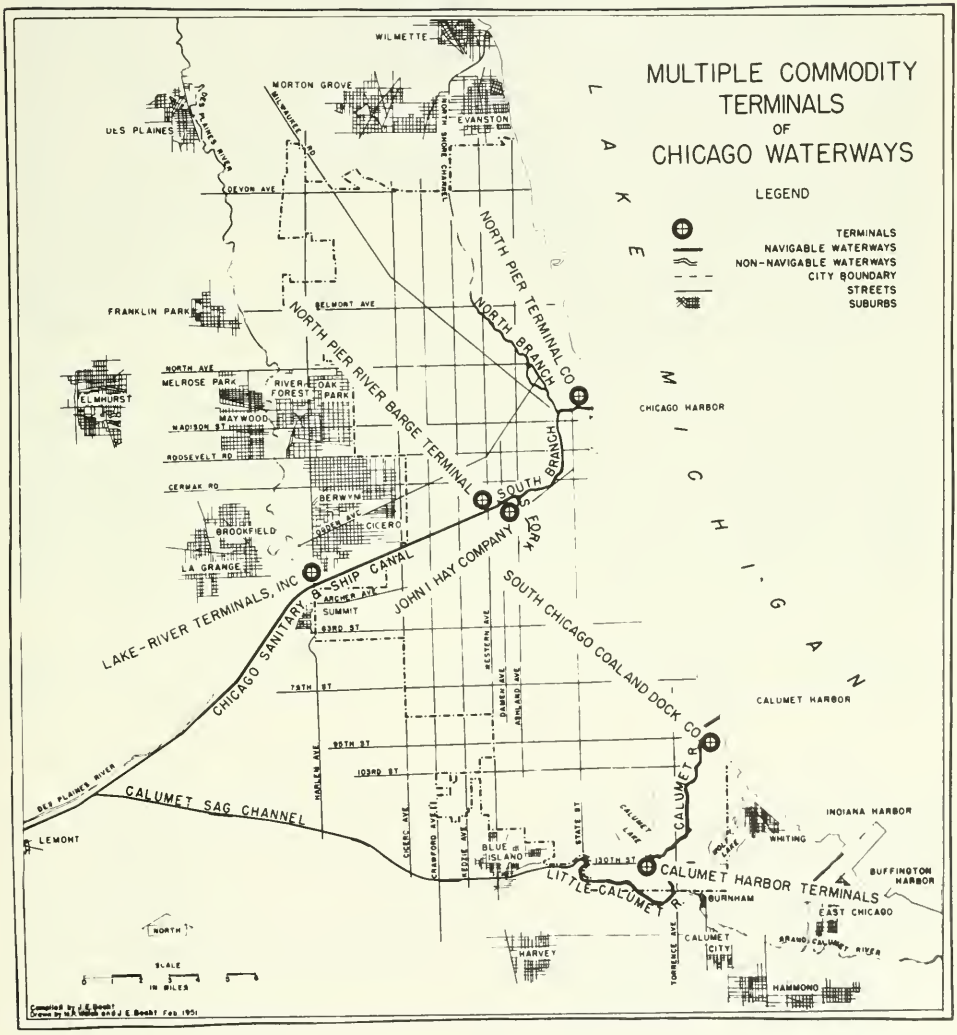

MULTIPLE COMMODITY TERMINALS OF CHICAGO WATERWAYS
LEGEND
TERMINALS
NAVIGABLE WATERWAYS
NON-NAVIGABLE WATERWAYS
CITY BOUNDARY
STREETS
SUBURBS
LAKE MICHIGAN
WILMETTE
MORTON GROVE
EVANSTON
DES PLAINES
DES PLAINES RIVER
DEVON AVE
FRANKLIN PARK
BELMONT AVE
NORTH PIER TERMINAL CO
NORTH BRANCH
NORTH PIER RIVER BARGE TERMINAL
CHICAGO HARBOR
NORTH AVE
MELROSE PARK
RIVER FOREST
OAK PARK
ELMHURST
MAYWOOD
MADISON ST
ROOSEVELT RD
CERMAK RD
BERWYN
CICERO
BROOKFIELD
LA GRANGE
SOUTH BRANCH
SOUTH FORK
JOHN I HAY COMPANY
LAKE-RIVER TERMINALS, INC
CHICAGO SANITARY & SHIP CANAL
ARCHER AVE
SUMMIT
SOUTH CHICAGO COALAND DOCK CO
CALUMET HARBOR
83RD ST
75TH ST
90TH ST
103RD ST
DES PLAINES RIVER
CALUMET SAG CHANNEL
LEMONT
MARLEN AVE
WESTERN AVE
DAMEN AVE
ASHLAND AVE
CALUMET R
INDIANA HARBOR
WHITING
BLUE ISLAND
130TH ST
CALUMET HARBOR TERMINALS
BURNHAM
LITTLE CALUMET R
BUFFINGTON HARBOR
EAST CHICAGO
CALUMET CITY
GRAND CALUMET RIVER
HARVEY
HAMMOND
NORTH
SCALE
IN MILES
Compiled by J.E. Boodt
Drawn by W.A. Wilson and J.E. Boodt Feb 1951

Fig. 17

and the John I. Hay Company has an Atchison, Topeka, and Santa Fe Railroad siding. Three important north-south streets, Western, Damen, and Ashland Avenues, are readily accessible. All three streets are important truck routes. Lake vessels, averaging from 3000 to 5000 tons, can be berthed for transhipping operations to or from barges. More than 550 manufacturing establishments are located within the industrial concentration centered about these two terminals.[1] The diversity of the products handled is considerable, and reflects not only the number but variety of these different manufacturing concerns (fig. 18).

The commodities handled at the North Pier Terminal Company illustrate this diversity. At docks at Western Avenue inbound sulphur is the leading commodity handled. Other leading materials loaded and unloaded are iron and steel articles such as rods, billets and pig, sugar and paper. Examples of southbound goods are corn and corn products, sugar bags, closet bowls, silicon steel, syrup, cleaning compounds, soap, and bicycles. Inbound items are skelp, scrap rubber, animal dip, steel wire, tin plate, tomato pastes, canned goods, newsprint, and baled wood pulp. Other inbound products are coco beans, beef extract for soup manufacturers, sisal, empty drums, sugar and green coffee beans.[2]

Lake-River Terminals is unique in that it specializes in a large variety of liquid products.[3] Fuel oil, gasoline, benzol, methanol, blackstrap molasses and tung oil are received, stored, drummed, and out-loaded. The handling of other liquid chemicals and foods are under consideration.[4] The terminal increased

---

[1]The Official Guide of The Railways, National Railway Publication Co., (New York, April 1950), p.242.

[2]Statement by Stanley Huggett, Jr., North Pier Terminal Co., personal interview.

[3]This terminal is treated in greater detail in the next chapter under petroleum.

[4]Statement by Abraham Feldman, Lake River Terminals, Inc., to Corps of Engineers, U.S. Army, (Public Hearing, Chicago, Illinois, August 1949).

from one 420,000 gallon tank in 1938 to a total of more than 16,000,000 gallons of tank volume in 1949,[1] and construction was then still underway.

Fig. 18--Interior of North Pier Terminal Warehouse, Western Avenue and the Canal. Products shown are cotton waste, electric machinery, paper for milk bottles, empty beer bottles--consigned to The Netherlands--chemical detergents, and soap.---Courtesy North Pier Terminal Warehouse.

The last of the four, Calumet Harbor Terminals, Incorporated, is located at the southern end of Lake Calumet (fig. 17). Situated near the center of the sprawling industrial zones of south Chicago, Gary, Whiting and Hammond, it has access to an excellent highway net; it has rail connections to the Indiana Harbor Belt, The Rock Island and the Illinois Central Railroads. Furthermore, the southern tip of Lake Calumet and the Calumet River have been dredged to a depth of 23 feet, sufficient for the largest lake vessels.

---

[1] Ibid.

The non-plant terminals are essential to brokers dealing in iron and steel, sugar, coffee and other commodities that lend themselves to third party negotiations. The following example of this kind of activity is regarded as "typical" by the Calumet Harbor Terminals, Incorporated.[1] Sixty railroad cars loaded with pig iron arrived at dockside from Keokuk, Iowa to be loaded on the lake steamer "Harry T. Ewig" for Buffalo, New York (fig. 19). The "Ewig" took aboard this cargo by using two magnetic cranes capable of lifting two tons at a time (this type vessel is also able to load directly from barges whenever occasion demands). The railroad cars when emptied were "light weighed" at the Rock Island yards and then returned to the terminal to be reloaded with Belgian and German pig iron that had arrived by barge after transhipment at New Orleans. This Belgian and German pig iron was then shipped to various destinations, among them were plants in Milwaukee, Wisconsin, Davenport, Iowa, and Peoria, Illinois.[2] In this operation the services provided by the non-plant terminals make possible the delivery of properly graded pig iron according to the exigencies of supply and demand.

Other non-plant terminals handle fewer kinds of commodities. South Chicago Coal and Dock Company ships and receives mainly iron, steel and coal cargoes. National Terminals in Joliet specialize in the transhipping of steel. A typical operation with them is the transferring to rail of skelp brought in barges from Pittsburgh and consigned to Milwaukee to be manufactured into seamless oil and gas pipe line. The pipe are then returned to Joliet by rail, reloaded into barges and moved to various ports in, or close to, the Louisiana and Texas oil and gas fields.[3] The principle commodity in transit at the lake front

---

[1]Statement by C. R. Olson, Calumet Harbor Terminals, Inc., personal interview.

[2]Olson, op.cit.

[3]Vaughan, op.cit.

Fig. 19--Loading pig iron from rail cars to lake steamer at Calumet Harbor Terminals, Inc., the cranes are part of the ship and can be fitted with clam-buckets or hooks as well as the electromagnets as shown.

and Western Avenue docks of the North Pier Terminal Company is sulphur. Especially during the summer months it is transferred to lake steamers bound for Buffalo, New York and to various wood pulp plants along the Great Lakes.[1]

The Illinois Waterway has access to international shipping not only via the Mississippi River to New Orleans but via the Great Lakes as well. At the lake front docks of the North Pier Terminal Company, as at Calumet Harbor Terminals, ocean-going vessels dock from Sweden, Norway, The Netherlands, and Canada with a wide range of cargoes--such as naphtholene from The Netherlands, steel from Sweden, whiskey from Scotland, wines from France and poppy and

---

[1]Huggett, op.cit.

caraway seeds for the baking industry from The Netherlands.[1] The Orange Line of Sweden plans to have a cargo ship dock in Lake Calumet at least every two weeks during the navigation season.[2]

Further treatment of dock facilities for various types of industries will be reserved for the discussion of specific commodities.

The waterways of Chicago are also vital to industries other than those shown on the map of barge users (fig. 15). As pointed out, numerous broker activities are dependent upon river and canal transport. Most numerous among these are grain, sugar, coffee, iron, and steel dealers. In addition to brokerage offices, several companies operating on a national scale, while not shipping on Chicago waterways, maintain their headquarters in the city and route materials by barge to various plants in cities on the Intracoastal Canal, the Ohio River, the Mississippi River, and downstream ports on the Illinois River. A national bag manufacturing firm, an international mineral corporation and the country's largest producer of earth-moving equipment are among these. In addition the waterway serves those manufacturing concerns that use Chicago only as a transhipping point. These include, among many others, large steel plants in Milwaukee and Buffalo, numerous chemical plants in New York, and southeastern Canada, and distilleries in The Netherlands.

Future Development

The number of industries locating on Chicago Waterways is increasing. In addition to the 120 active riparian industries currently using the Illinois Waterway at least 18 other business organizations have purchased property for

---

[1]Jeanne Todd, "Right in Our Own Back Yard", The Pallet and Brush, (Sherwin-Williams Company, Chicago, Illinois), Vol. XXIII, June 1950.

[2]Olson, op.cit.

future use (fig. 16). Cement producers, coal distributors, railroads, chemical industries, and a printing concern are among those planning their own dock facilities. That further plans and work are under consideration is evidenced by the fact more than 40 leases have been signed with the Chicago Sanitary District during the period from January 1 to September 15, 1950. This figure of 40 some leases in an eight and one-half month period compares with an average of two new leases annually during the decade from 1930 to 1940.[1] Some of the 40 leases signed in 1950 were for five year periods but 50-year terms were most common. Manufacturers can obtain leases for any length of time up to 99 years, providing they satisfy Sanitary District Commissioners of their company's ability to be financially successful. Industry is not precluded from land currently in agriculture since all leases to farmers renting Sanitary District property stipulate that the land must be vacated in favor of industry.[2]

Riparian property is still available but the best industrial sites have been taken. With recent purchases of property along the Sanitary and Ship Canal there is no longer land available here.[3] Land along the Des Plaines River (fig. 17) does not lend itself to industry for drainage reasons. Also, certain sociological and economic aspects of land ownership make it undesirable to develop the land northwest of the canal between Lemont and Summit.[4] This area is occupied by high cost residential communities, country clubs, research farms (for example, those of the International Harvester Company and the Vaughan Seed Company) and the Argonne National Laboratory. As a result of such high-priced land,

---

[1]Statement by Paul J. Healy, Real Estate Department, Chicago Sanitary District, personal interview.

[2]Ibid.

[3]Healy, op.cit.

[4]Querl, Chicago Association of Commerce.

industry is turning to areas along the Sag which are as suitable, and much less expensive.

South of the Canal and along the Sag conditions are different (fig. 15). Here recent purchases and leases have closed the riparian sites south of the canal but along the Sag there are over three thousand acres of "raw land"; that is, idle land or ground not intensively cultivated, and accessible to rail transport. This total includes only land requiring a rail siding less than one-fourth of a mile long.[1]

The development of new manufacturing districts along the Sag is contingent upon the completion of the Sag project.[2] The improvement of the Calumet-Sag Channel was authorized by Congress in 1946 but work has not been started. Navigation restrictions of low bridges and a narrow sixty-foot channel are to be eliminated (fig. 20) by raising bridge clearances and by widening the channel to a controlling width of 225 feet.[3] Not only would the completion of the Sag project open many acres of land to industrial development but it would also permit industries now located on the waterway to use it for transportation. The Torrence Avenue Ford Assembly plant has excellent dock facilities already constructed and would ship new cars by barge if there were sufficient bridge clearances (fig. 21).[4] The importance of limitations placed on navigation in the Sag by low fixed bridges cannot be overemphasized. Not only are the more powerful towboats precluded from this waterway but bridges necessitate the removal of

---

[1]Ibid., one-fourth of mile was used by The Chicago Association of Commerce as the average maximum distance it was economical to construct railroad siding in order to reach plants along the Sag Channel.

[2]Querl, op.cit.

[3]Stuart B. Bradley, The Calumet Sag Project, (Chicago Association of Commerce and Industry), 1949, p.2.

[4]Statement by K. J. Milliken, Ford Motor Co., personal interview.

Fig. 20--Low fixed bridges and narrow channel of the Sag. Clearing of the closest bridge is only 14 feet, 10 inches.

searchlights and exhaust stacks in addition to retracting the pilot house. Frequently it is even essential to carry a full load of fuel aboard the towboats that do enter. The added inches of clearance provided by a full fuel load often means the difference between whether or not it is possible to use the canal without first taking aboard ballast (fig. 22). These navigation difficulties have resulted in additional tariffs being placed on cargoes bound for South Chicago in comparison to Chicago, although the distance from each to the junction of the Sag and Sanitary and Ship Canal is approximately the same. Some examples of these differences are: nine cents a ton on coal,[1] five cents a ton on sand[2] and as much

[1]Central Barge Company, Supplement No. 10, to I.C.C. No. 50, p.2.
[2]Marine Transit Company, Supplement No. 11, to I.C.C. No. 7, p.4.

Fig. 21--Ford Motor Company Assembly plant at Torrence Avenue and The Calumet River. Note existing dock facilities at lower right.--Courtesy Ford Motor Company.

as 32 cents a net ton on iron and steel articles.[1]

In addition to Sanitary leases there are other recent land purchases that promise to result in the industrialization of new areas close to the waterway. The New York Central Railroad has obtained land on the south side of the Canal between Cicero Avenue and Ridgeland Avenue (fig. 17). More than a hundred acres is adjacent to Sanitary District property and officials of the District anticipate the railroad will seek a lease for water frontage.[2] Also, the Chicago, Rock Island and Pacific Railroad Company has recently acquired 355 acres of land for industrial development between 95th Street and 130th Street immediately

[1]John I. Hay Company Tariff, Supplement No. 13, to I.C.C. No. 14, p.7.
[2]Healy, op.cit.

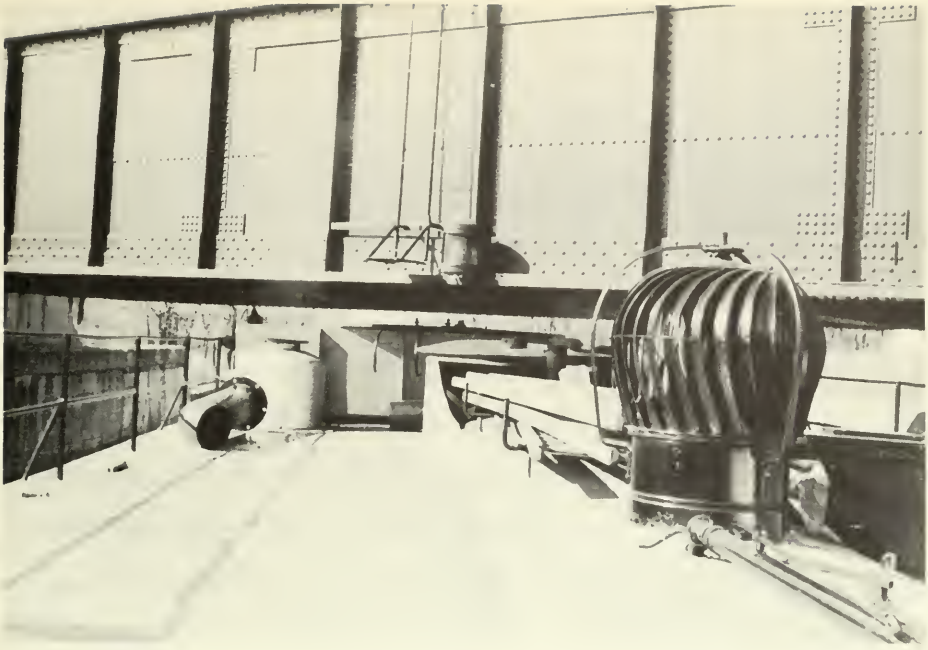


Fig. 22--Towboat passing under the Sag Channel Rock Island Railroad bridge with less than three inches of clearance. Notice retracted pilot house, detached exhaust pipes and mast.

west and south of Lake Calumet.[1] The land is available for sale or lease to industries requiring rail service. The property is within the effective pick-up and delivery area for less-than-carload-lots freight and has direct rail connections to Calumet Harbor Terminals, Incorporated.[2]

Land on either side of the Sag Channel and in the Lake Calumet area is ideal for industry. The region is level, and has good foundation. Transcontinental railroads and highways traverse the area and lake and barge facilities are available. There is one disadvantage in that the boundary of the Chicago Switching

---

[1]Statement by R. E. Dugan, Chicago, Rock Island and Pacific Railroad Company, personal interview.

[2]Ibid.

District crosses from northwest to southeast just west of Blue Island. The Sag Channel east of Blue Island, Lake Calumet, and along the Grand Calumet to, but not including Gary, do lie within the Switching District. This means that the area outside of the Switching District will have the disadvantage of higher freight rates to other Chicago industries.

Summary

More than 120 industries are currently using the Illinois Waterway, each generally specializing in the shipment of one principal commodity by barge. Terminals and warehouses operated by certain of the river carriers or terminal companies provide loading and unloading facilities for inland manufacturing plants. The major areas of industrial zones are traversed by the waterways and more than three-fourths of all commodities originate or terminate at the docks of riparian industrial plants rather than being handled through transhipping terminals.

Contingent upon completion of the Sag project there is ample space for industrial growth. Active current expansion is indicated by the number of leases recently negotiated and those presently under consideration. Thus, indications are that the Chicago market will continue to expand, and the remainder of this study will be an analysis of the potentials of the origins, traffic and markets for the various commodities barged into and out of the Metropolitan area.

IV. TRAFFIC PATTERNS OF MAJOR COMMODITIES BARGED TO AND FROM CHICAGO--COAL, SAND AND GRAVEL, PETROLEUM, AND GRAIN

Introduction

The greatest advantage water transportation has to offer is in the movement of heavy, bulk commodities that lend themselves to rapid automatic loading or unloading devices. Because of this approximately 80 per cent of the total tonnage carried on the waterway consists of coal, sand and gravel, petroleum products and grain. On a tonnage basis coal is the leading commodity. This is not unexpected because Chicago is one of the world's largest coal markets, and Illinois is one of the leading coal producing states and several large coal producing districts are near the waterway.

The commodity second in tonnage carried on the waterway is sand and gravel, which is almost equaled by the amount of petroleum products carried. Direct access of water transportation to the numerous and large deposits of glacial outwash materials in the Illinois River valley has resulted in a heavy barge movement of sand and gravel toward Chicago.

Petroleum products moving from riparian refineries and pipe line terminals in Texas, Louisiana, Arkansas, and from Wood River and Hartford, Illinois, reach the Chicago market by barge. Although these cargoes reached an annual Illinois Waterway tonnage total in excess of 2,000,000 net tons, very recent indications show they will continue to increase at a rapid rate during the next few years.

Traversing some of the most productive farm land in the United States, the Illinois Waterway might be expected to carry a large volume of grain to the world's largest grain market--the Waterway's northern terminus, Chicago. Grain collecting elevators, strategically located, stand high on the banks of the Waterway from Montezuma, only 50 miles above Grafton at the Mississippi and Illinois River junction, to Lockport. Ten large waterfront elevators in Chicago receive and tranship bargeloads of grain to lake vessels, rail and truck.

The origins, traffic and markets of these four leading commodities are treated in this chapter. The advantage to shippers in moving a bulk type of product is probably the greatest single contribution the Illinois Waterway can make to the nation's total economy. Therefore, these four commodities have been grouped together in the organization of this study.

A. COAL

Introduction

The traffic pattern of the Illinois Waterway reflects, in large measure, the movements of coal. Between one-third and one-half of all traffic on the waterway consists of this one commodity. In six of the last seven years coal has constituted more than 40 per cent of the grand total of all traffic carried annually (fig. 23). In 1949 the relative position of coal declined because of large increases in traffic movements of sand, gravel, petroleum, iron, steel and grain combined with a drop in coal production and shipment due to strikes.[1]

IMPORTANCE OF COAL TO ILLINOIS RIVER TRAFFIC[a]

Year	Net Tons of Coal Tonnage	Net Tons of Total Traffic	Per Cent of Total
1949[b]	4,011,693	12,895,114	31
1948	5,136,107	12,272,945	42
1947	4,766,464	10,356,323	46
1946	3,143,286	6,913,721	45
1945	3,629,730	6,590,939	55
1944	4,190,808	7,803,577	53
1943	3,016,550	6,445,373	47

[a]Data for 1943-1948 contained in a letter from Statistical and Research Department, The American Waterways Operators, Inc., Washington, D.C., August 7, 1950.

[b]Department of the Army, Corps of Engineers.

Fig. 23

The high place of coal on the list of water-borne commodities in Illinois is not surprising because the state is fourth in the nation in coal production[2]

[1]Department of the Army, Corps of Engineers.

[2]Walter H. Voskuil, "Illinois Mineral Industry in 1948", Illinois State Geological Survey, Urbana, Illinois, 1950, p. 16.

and contains, in Greater Chicago, what is perhaps the greatest coal market in the world.[1] Approximately 65 per cent of the state is underlaid with coal deposits and there is a minimum of seven producing seams, varying from three to ten feet in thickness (fig. 24).[2] The coal, although bituminous, is not as good quality as that of the Appalachian states of Pennsylvania, West Virginia and Eastern Kentucky. However, it is superior to most coals of Europe.[3]

The development of the Illinois coal industry and that of the waterway have been reciprocal in many ways. The waterway has played an important role in the development of the Illinois coal industries and it is likewise true that coal, the leading commodity of current river traffic, has been a boon to river carriers. The very first recorded coal mined in the state was shipped from Jackson County (Du Quoin District, fig. 24) by flatboat to New Orleans.[4] The transportation of coal by water remained important up until late in the nineteenth century as indicated by the fact that thirteen of the nineteen leading producing counties up to that time had access to navigable rivers.[5]

Railroads also depended on coal for much of their traffic and were increasingly successful in the coal carrying trade. The first railroad in the Mississippi valley was built to carry coal out-cropping in the ravines along the bluffs of St. Clair and Madison counties (Belleville District, fig. 24), to the banks of the Mississippi opposite St. Louis.[6] By 1925 the only coal loaded on the

---

[1]Arthur H. Doerr, "Chicago's Coal: Its Origin, Movement to Market and Use", Journal of Geography, Vol. XLIX, October 1950.

[2]Gilbert H. Cady, "Analyses of Illinois Coals", Supplement to Bul. 62, Illinois State Geological Survey, Urbana, Illinois 1948, p.7.

[3]J. Russell Smith, M. Ogden Phillips, "Industrial and Commercial Geography", (New York, Henry Holt and Co., 1946), p.80.

[4]S. O. Andros, "Coal Mining in Illinois", Bul. 13, Illinois State Geological Survey, 1915, p.13.

[5]Bessie L. Ashton, The Geonomic Aspects of The Illinois Waterway, University of Illinois, Urbana, Illinois, 1927, p.90.

[6]Ibid.

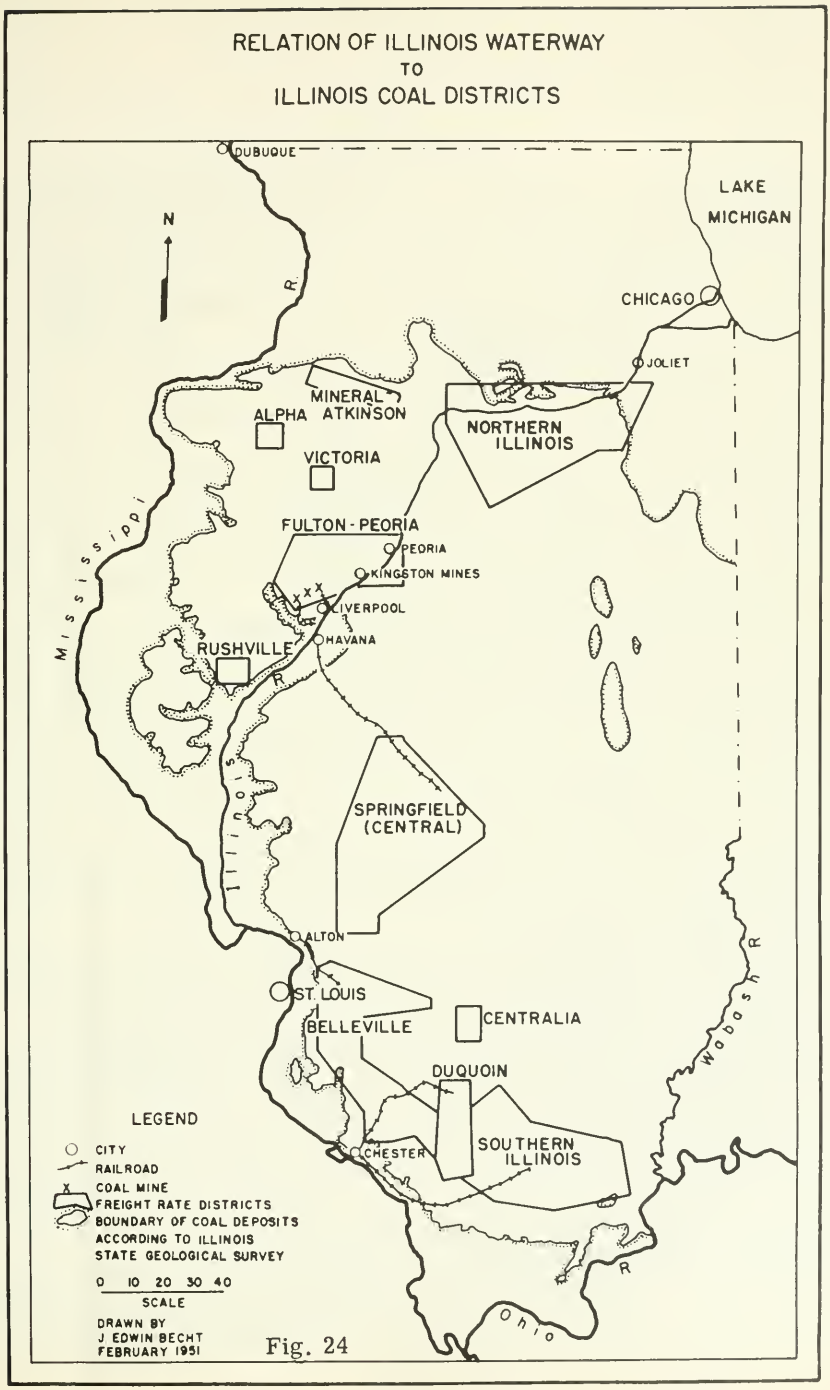

RELATION OF ILLINOIS WATERWAY
TO
ILLINOIS COAL DISTRICTS
DUBUQUE
LAKE
MICHIGAN
N
CHICAGO
JOLIET
MINERAL
ALPHA ATKINSON
NORTHERN
ILLINOIS
VICTORIA
FULTON - PEORIA
PEORIA
KINGSTON MINES
LIVERPOOL
HAVANA
RUSHVILLE
Mississippi R.
Illinois R.
SPRINGFIELD
(CENTRAL)
ALTON
ST. LOUIS
BELLEVILLE
CENTRALIA
DUQUOIN
CHESTER
SOUTHERN
ILLINOIS
Wabash R.
Ohio R.
LEGEND
CITY
RAILROAD
COAL MINE
FREIGHT RATE DISTRICTS
BOUNDARY OF COAL DEPOSITS
ACCORDING TO ILLINOIS
STATE GEOLOGICAL SURVEY
0 10 20 30 40
SCALE
DRAWN BY
J EDWIN BECHT
FEBRUARY 1951

Fig. 24

Illinois Waterway was loaded at Kingston Mines for local delivery, and then in small tonnages and at irregular intervals.[1]

Rate Pattern

The influence of rail rates has been an important factor limiting the expansion of Illinois Waterway coal traffic, but, if present plans materialize,[2] the pattern of this coal traffic will be greatly altered. Patterns of carload rates on coal for the Fulton-Peoria, Springfield, and Southern Illinois districts all reflect influences of existing, or potential, barge routes (figs. 25, 26, and 27). These patterns were developed by plotting published carload coal rates per net ton to all listed county seats. The isophors[3] were then plotted by interpolation.

The rate pattern about the Fulton-Peoria[4] district spreads out to the northwest, north and northeast (fig. 25). This indicates lower rates are in effect in these directions, and it can be inferred that these are the directions in which the greatest volume moves. Also, the U-shaped bulges, centered on the waterway, and pointing to Chicago, illustrate the effects of water transportation on rail rates. These show that rail rates to areas parallel to the waterway have

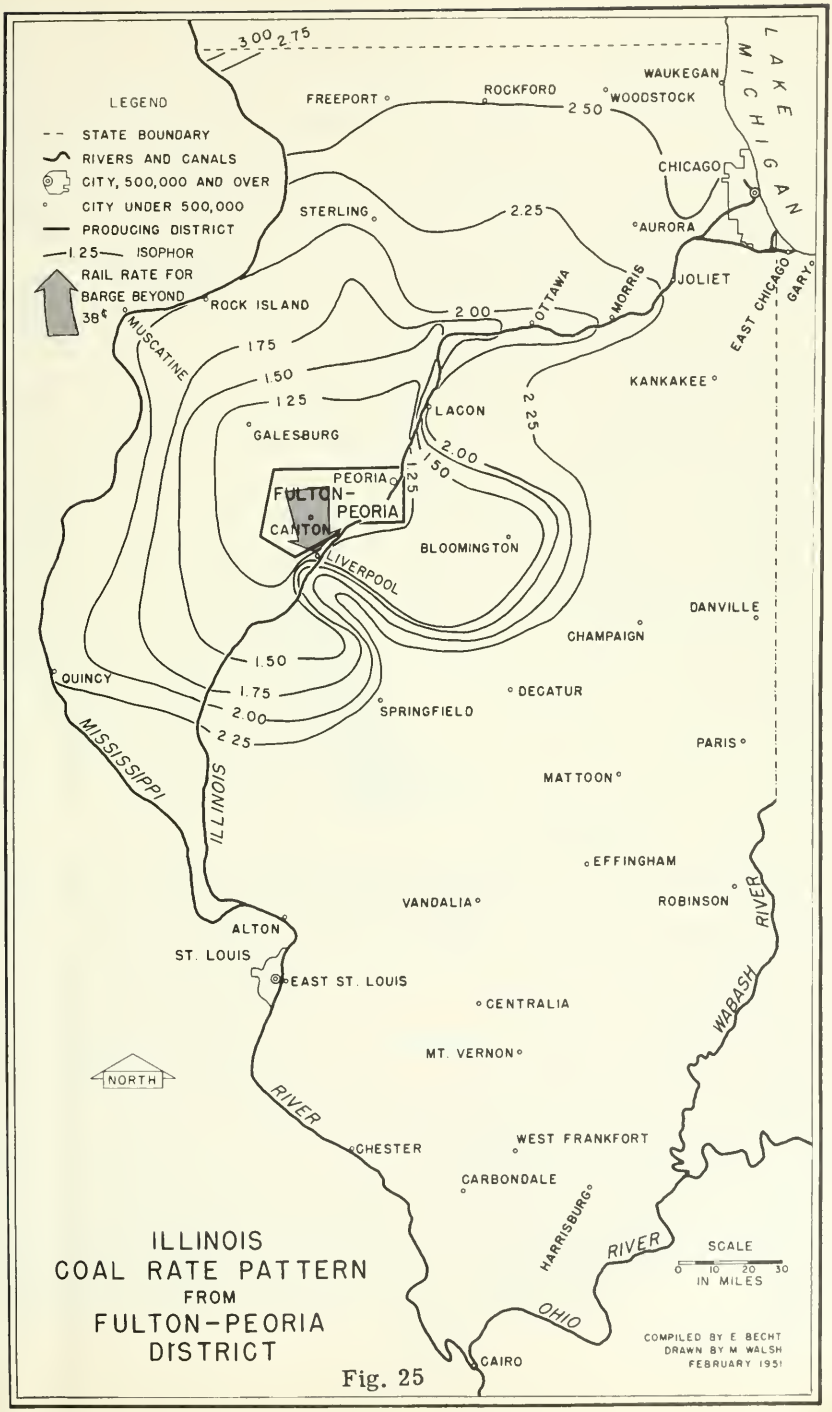
---

[1] 12,750 tons of a total of 40,659,826 tons shipped in Illinois went by water according to Ashton, op.cit., p.91.

[2] As a result of a series of rate "breaks" the total combined tariff for rail-barge is now sufficiently low to permit carrying coal on the Illinois Waterway. A detailed discussion of how these "breaks" came about follows.

[3] Isophor is a combination of the Greek words iso and phortion. Iso meaning equal and phortion meaning freight, the combined term meaning equal freight. The term was first used by C. L. Stewart, Agriculture Economist, University of Illinois to demonstrate grain rate patterns in Illinois. Isophors are lines connecting those points having equal freight rates for a given commodity to a certain market; or, from a specific factory or producing district to all consumers enjoying the same rate for the product under consideration. A warning should be interjected to the effect that isophors do not represent actual rates but schematically portray rate changes and variations.

[4] The three coal producing districts discussed have been selected because they are currently, or potentially, the main origins of coal traffic on the Illinois Waterway. These districts are: Fulton-Peoria, Springfield and Southern Illinois.



ILLINOIS
COAL RATE PATTERN
FROM
FULTON-PEORIA
DISTRICT

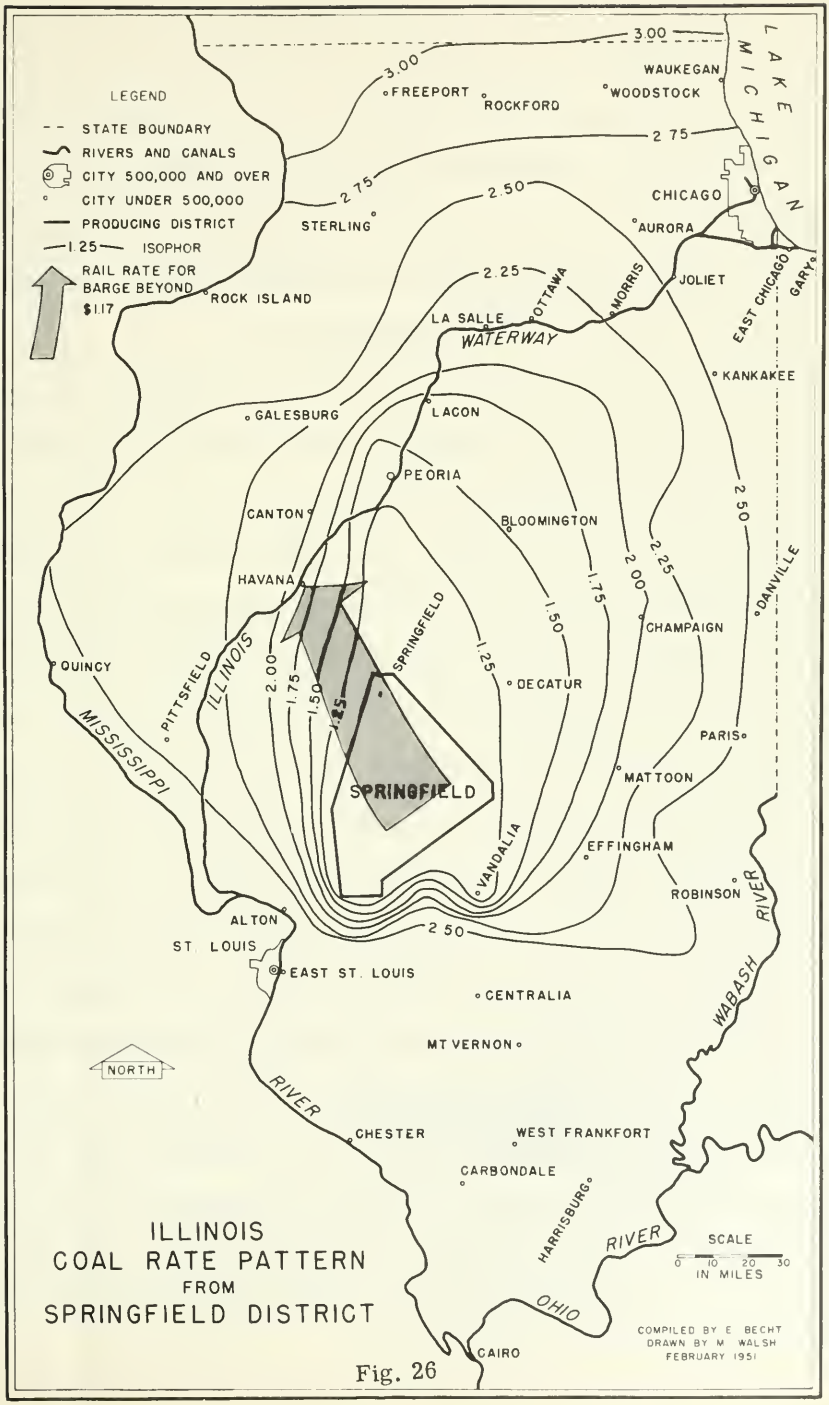
Fig. 25

been maintained at lower levels than those to inland points--away from the river. The reason similar bulges do not extend southward is lack of a market in this direction due chiefly to competition from the Belleville district (fig. 24). The distance between the isophors toward the northwest also reflect water competition. Coal loaded into barges reaches Muscatine and Rock Island at barge-rail rates of approximately $2.10.[1] Thus, the rail rates of $2.09 to Muscatine, and $1.98 to Rock Island are sufficiently low to preclude barge coal along this part of the Mississippi River. It is not until the isophors grouped in Northwestern Illinois are passed that towboats are able to compete with railroads in the upper Mississippi valley. The indentation made by the isophors toward Havana (8 miles below Liverpool) parallel the Chicago and Illinois Midland Railroad. Havana has rates from the Springfield District of $1.89 for local delivery and $1.17 for via barge beyond. The low rate to Havana is a response to competition between railroads. Originally, the rate now in effect was established in order to gain the market offered by the electric power plant at Havana.[2] Currently, however, this plant is using coal barged from Liverpool.

The pattern about the Springfield District also reflects northern markets (fig. 26), the greatest spread occurring toward its market--Chicago. In this case the bulges are centered to the south of the waterway and the rate contest is for the Chicago market rather than the cement, zinc, glass, power and chemical plants along the waterway. Springfield coal does not move very far south. This is due to competition with the Belleville District and the various producing zones

[1]Figures given for any mediums of transportation indicating cost of carrying commodities are, unless otherwise specified, the freight paid by the consignor or the consignee--frequently referred to as the shipper in this study. These figures do not necessarily give the actual cost to the carrier of moving commodities.

[2]Hall, op.cit.



ILLINOIS
COAL RATE PATTERN
FROM
SPRINGFIELD DISTRICT

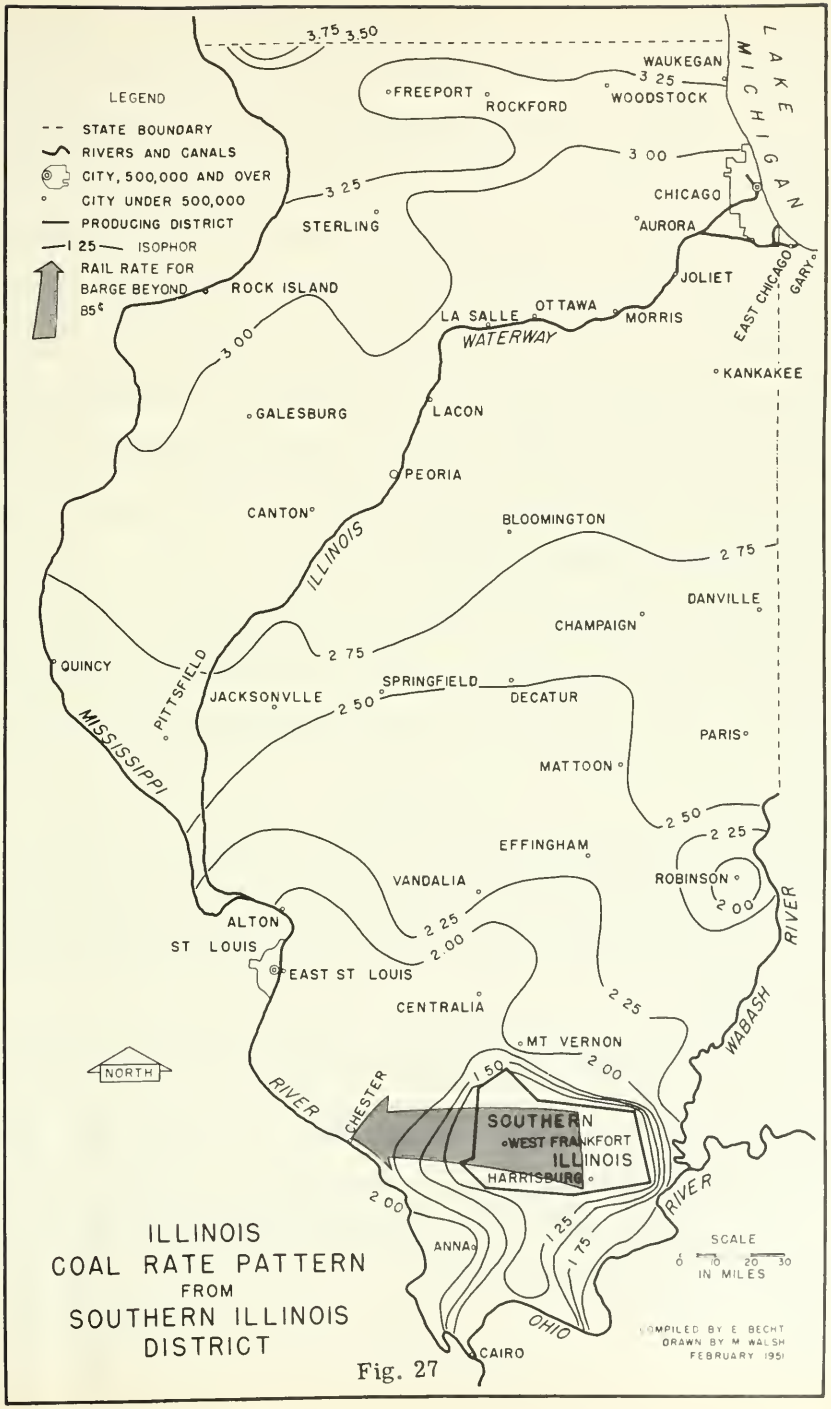
Fig. 26

of Southern Illinois. Figuratively speaking, toward the west, a rate barrier separates the Springfield area from the river. The $1.25 bulge reaching the river immediately south of Peoria can be accounted for by the presence of the Powerton generating plant at Pekin. The rate is necessarily low to enable Springfield mines to compete with the Fulton-Peoria coal-producing district. For example, at the Central Illinois Light and Power Company plant at East Peoria, only eight miles distant, coal is received at the local switching rate.[1]

As with the previous two districts discussed, the Southern Illinois district also reflects competitive factors at work (fig. 27). The only "rate valley" revealed by the isophors to reach a waterway is toward the south. The net ton rate to Cairo is $1.32; stations enroute, such as Anna, Illinois, and on a main rail line, have rates exceeding $2.00. The rates to Ohio River ports are low not only because of potential barge competition but also due to the proximity of the West Kentucky fields. The isophors show that nearly equal rates are in effect all the way from Chester to St. Louis. Therefore it is not likely that coal would move to St. Louis by rail and barge via Chester. Also, the rail rate of $1.85 to Chester is nearly two-thirds of the total rail rate to Chicago. The difference, only $1.12, is but twenty-eight cents less than the barge rate from Chester to Chicago. From this must be taken transhipping costs. This combination has--up to the present time--precluded barging of Southern Illinois coal to Chicago.

It has been shown that the rate patterns for all three districts reflect barriers to a degree which bar coal traffic from the waterways; however, one by one these rate barriers have been penetrated as indicated by the arrows in figures 25, 26, and 27. First the Commonwealth Edison system, through its

[1]Statement by James T. O'Dea, President Peoria and Pekin Union Railway Company, personal interview.



ILLINOIS
COAL RATE PATTERN
FROM
SOUTHERN ILLINOIS
DISTRICT

Fig. 27

"captive railroad", the Chicago and Illinois Midland Railroad Company, established the low rate to the Havana loading plant of $1.17 per net ton.[1] This is in contrast to a regular rate for local consumers of $1.86.[2] The rail-barge rate from the Springfield district to Fiske Station in Chicago is $1.95, a combination of the $1.17 rail rate and a seventy-eight cent barge rate.[3] Thus, the waterway effects a saving of at least 69 cents per net ton over the all-rail rate of $2.64.[4] On the 4,500,000 tons of coal moving annually in this manner there would be a difference of $3,105,000. Out of this sum must be operated loading and unloading plants. However, without water competition it is doubtful whether or not rail rates would have remained as low as they have, therefore the true savings may actually exceed the amount just indicated.

The second "break" in the rail structure was made in the Fulton-Peoria district. Here railroads made public tariffs for rail-barge rates only after the United Electric Coal Companies constructed their own railroad from their strip mines near Canton.[5] The rail rate in this district is now less than 40 cents per net ton to barge loading plants.[6] The barge rate to Chicago is 84 cents, making a combined rate of $1.24 per net ton as compared with an all-rail rate of $2.51. Here a savings of $1.27 per net ton is effected, out of which must be paid loading and storage costs.

The last "break" and perhaps the most important, is currently in the

---

[1]Letter from V. H. Williams, Chicago and Illinois Midland Railroad Company, February 19, 1951.

[2]Letter from N. E. White, Illinois Central Railroad, December 19, 1950.

[3]Central Barge Company, Supplement No. 10 to Tariff No. 50, p.1. It should be pointed out practically all coal moves from Havana to Fiske Station in jumbo-size barges for 72¢ per net ton.

[4]Bromage, op.cit.

[5]Klise, op.cit.

[6]Ibid.

process of occurring. A loading facility is planned at Ford, Illinois, 3.7 miles south of Chester, Illinois, on the Mississippi River (fig. 27). The Missouri Pacific Railroad has recently published rates of 85 cents per net ton from mines on its line in the Southern Illinois and Du Quoin districts, and 75 cents per net ton from the Belleville district, to Ford on shipments for movement beyond via barge.[1] Relative rates have not as yet been established from mines in the same origin districts on other railroad lines to Ford.[2]

The combined rail-barge rate on the best coal of Illinois would be $1.40[3] plus 85 cents or $2.25, as compared with the current all-rail rate of $2.97. A savings of 72 cents a net ton would be effected; this amount is three cents a ton more than that saved on ex-barge coal from the Springfield district. However, there is no doubt but what loading costs would be considerably higher if coking coals were to be handled, since maintaining a proper size coal for coking would necessitate a system providing a minimum of breakage.

Origins

The proximity of current leading coal-producing counties to the waterway places them within easy reach of it (fig. 28), and once again transportation factors are such as to stimulate the barging of coal. Coal is currently loaded at three main points on the waterway for movement to Chicago. They are 1) Commonwealth Edison at Havana, 2) Truax-Traer Coal Company, one and one-half miles south of Liverpool, and 3) United Electric Companies, one-half mile north of Liverpool (fig. 24). Prior to 1933 all Illinois coal destined for the Chicago market was either shipped by rail or truck. In that year, when it became apparent

[1]Sanders, op.cit.
[2]White, op.cit., February 20, 1951.
[3]Letter from A. M. Thompson, Central Barge Company, February 16, 1951.

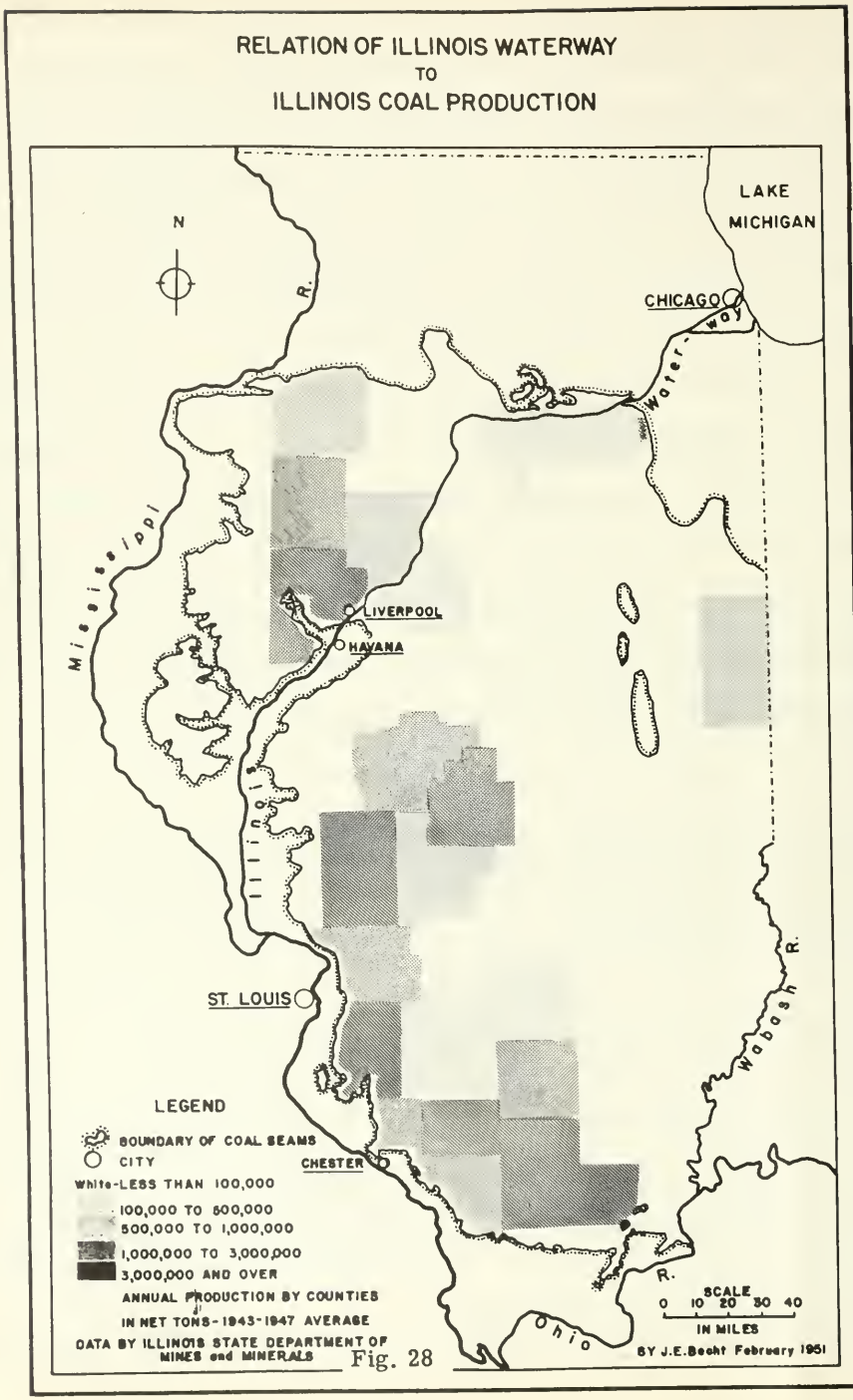

RELATION OF ILLINOIS WATERWAY
TO
ILLINOIS COAL PRODUCTION
LAKE
MICHIGAN
N
CHICAGO
Water-way
Mississippi R.
LIVERPOOL
HAVANA
Illinois R.
ST. LOUIS
Wabash R.
CHESTER
Ohio R.
LEGEND
BOUNDARY OF COAL SEAMS
CITY
White-LESS THAN 100,000
100,000 TO 500,000
500,000 TO 1,000,000
1,000,000 TO 3,000,000
3,000,000 AND OVER
ANNUAL PRODUCTION BY COUNTIES
IN NET TONS - 1943-1947 AVERAGE
DATA BY ILLINOIS STATE DEPARTMENT OF MINES and MINERALS
SCALE
0 10 20 30 40
IN MILES
BY J.E.Becht February 1951

Fig. 28

the Illinois Waterway was to be opened and maintained, the Commonwealth Edison Company of Chicago decided to build a test loading plant at Havana (fig. 24). By 1935 the experiment was successful to such a degree it was decided to build a more substantial plant; this plant was readied by 1936 and was designed to handle 800,000 tons per year.[1] Economies of barge coal were such that, in 1948, by working twenty-four hours a day under forced operations, they were shipping 3,000,000 tons annually. The company then was faced with the problem of modernizing existing facilities or of constructing a new plant. The latter course was decided upon and new facilities designed to handle 18,000 tons of coal in ten hours was completed in 1949 (fig. 29). The hoppers of this new loading plant

Fig. 29--Havana Loading Plant at the Commonwealth Edison Co. Two chutes can drop 1300 tons of coal into a barge in 36 minutes. This is at the rate of 36 tons a minute.

[1]Statement by W. H. Bromage, Commonwealth Edison Co., personal interview.

hold five carloads of coal so maintained as to feed a chute and belt delivering coal evenly to a waiting barge. No sorting or grading of coal is performed until it reaches the consuming plant where it is made into the desired size.[1]

Other coal companies have also built barge loading facilities. The Truax-Traer Coal Company was the first of these to begin river operations. In 1938 this company trucked coal from mines within a radius of twenty miles of Copperas Creek, eight miles below Kingston Mines (fig. 24), however, it was chiefly from strip mines in the vicinity of Canton, Illinois. In 1948 they abandoned their truck dump at Copperas Creek for a new rotary rail-car unloader one and one-half miles south of Liverpool (fig. 24). From strip mines near Fiatt and Canton, Illinois they move their coal twenty-seven miles by rail to the river. A part of the distance it moves on privately owned rails, the balance on the Chicago, Burlington and Quincy tracks.[2]

The United Electric Coal Companies have built a coal-loading plant one-half mile north of Liverpool (fig. 30). Their coal is currently coming over a seven-mile-long company-owned railroad that winds down a tributary valley to the Illinois. Both of the above companies operate on a large scale. In contrast to the shaft mines of the Springfield district which ship mine run coal, these concerns sell washed and graded coal. Their operations include carrying coal in twenty-ton trucks from various points in their strip mines to washers (fig. 31). From the washers the coal is loaded into rail cars for transport to barges.

A fourth loading point for coal is at Liverpool (fig. 24). Here trucks bring coal from numerous small mines within a twenty-five mile radius (fig. 32).[3]

---

[1] Ibid.

[2] Statement by A. L. Sanders, Truax-Traer Coal Co., personal interview.

[3] Statement by D. D. Klise, The United Electric Coal Companies, personal interview.

Fig. 30--United Electric Coal Company's Coal Loading Plant one-half mile north of Liverpool.--Courtesy The United Electric Coal Companies.

Shipments from Liverpool have been more sporadic than those of the aforementioned docks. During 1950 navigation difficulties were experienced there because barges "tied off" in an old chute could not be fully loaded due to shallow water, silting having filled in much of the anchorage. In an attempt to prevent silting, a dam had been constructed across the upstream opening of the chute resulting in "quiet water". As a result, exactly the opposite occurred. Lack of a scouring current appears to be hastening the process of filling in the chute

Fig. 31--Scene in Buckheart No. 17 Mine of The United Electric Coal Companies. Twenty-ton trucks move coal to washers for loading into rail cars for transport to river loading plants.--Courtesy The United Electric Coal Companies.

and dredging must be undertaken in order to maintain a channel. It is doubtful whether or not the marginal nature of shipping coal by truck and barge from Liverpool in competition with rail-barge origins will permit the added cost of constantly clearing a navigable slip.[1] Thus, it may be this coal dock will be forced either to shut down completely or to change its location.

Coal is also loaded at Alton, Illinois (fig. 24). It reaches the loading docks there by rail from the Belleville, Southern Illinois and West Kentucky fields. However, in 1950, less than one per cent of all coal northbound through Peoria lock originated south of the New La Grange Locks.[2] Rather, most of the coal

[1]Statement by M. Murphy, District Engineer, Corps of Engineers, U.S. Army, personal interview.

[2]Preliminary lock data from Corps of Engineers, U.S. Army.

Fig. 32--A type of mine that occasionally ships to Liverpool Docks. This mine is on U.S. Highway 24, 4 miles north of Liverpool.

barged from Alton enters the upper Mississippi River markets. In 1949 one large coal company alone shipped more than 60,000 net tons in this manner.[1] As pointed out, in the vicinity of Dubuque (fig. 24) there is a sharp rise in rail rates on coal (fig. 27), so that extending northward of this river port to St. Paul there is a coal market with lowest rates on ex-barge coal.[2]

To date the waterway has not been carrying the best Illinois coal to the Chicago market. Illinois coal is not uniform in distribution or quality. In general, coal seams of the state increase in thickness and quality from north to south. The Northern Illinois district has relatively thin seams, averaging three

[1] Statement by Sanders, op.cit.
[2] Statement by A. M. Thompson, op.cit., personal interview.

feet, deposits in the Fulton-Peoria district average about four feet, those around Springfield approximately seven feet, but, in Williamson County, in the Southern part of the state, the main seam is over nine feet. In addition to an increase in thickness of seam the quality of Southern Illinois coal is better as regards the rank index (British thermal unit) and sulphur content (fig. 33).

The Northern Illinois district, even though traversed by the waterway, does not make barge shipments. There are several reasons for this. Chief among these is the very low rail freight rate in effect. The rate originally was permitted by the Interstate Commerce Commission on the premise it was more costly to mine thin coal seams of the area than thicker seams in Central and Southern Illinois.[1] The small savings resulting from water shipments would be offset by capital investment and storage costs. Also, the coal has good qualities for Chicago's domestic market and trucks are used to transport it for that purpose.

QUALITY OF ILLINOIS COAL[a]

District	Coal Beds Mined	Average[b] Rank Index	Average Per Cent of Sulphur	Chief Mining Method
Northern Illinois	2	123	3.6	Strip
	6	123		
Fulton-Peoria	1	130		
	5	119	4.0	Strip
	6	119		
Springfield	5	123	3.6	Shaft
	6	127		
Belleville	5	127	3.3	Shaft
	6	127		
Southern Illinois	5	138	2.6	Shaft
	6	134		

[a]Source--Cady, op.cit., pp. 9 and 59-70.
[b]In thousands of b.t.u.

Fig. 33

[1]Statement by Gilbert H. Cady, Coal Division, Illinois State Geological Survey, personal interview.

Also, by not making advance bulk commitments for Chicago industries, these mines stay more responsive to domestic prices. They do enter the Joliet market under a local switching rate and are used by industries in that city.[1]

Coal currently borne on the waterway is of limited use. It is restricted to power and heat application and only to those companies with sufficiently large plants to take up in volume occasional poor quality.[2] Its principal uses are for utilities, and the manufacture of ceramics, cement, chemicals, glass, in zinc reduction and in steel production.[3] However, if Southern Illinois coal is made available to waterway traffic, under the newly proposed rates, part of the domestic market and, in time, even metallurgical coke[4] may be supplied by barge, thereby greatly increasing the demand for water-carried coal.

There are additional developments pending that might further stimulate the moving of coal by barge. One possibility is the wide adoption of the "Fellows Smokeless Furnace", designed to provide nearly complete combustion of coal. At present prices it provides fuel savings of almost 100 per cent compared with the cost of fuel oil or liquid gases.[5] Designed for the domestic market, this furnace can use the lower rank Illinois coals and, if widely adopted, would create a large domestic market for barge coal. Another possible development is the separation and use of sulphur in coal.

Traffic

Coal is moved toward Chicago in tows consisting of six to eight barges as

---

[1]Sanders, op.cit.
[2]Statement by Charles Holland, Holland Coal Co., personal interview.
[3]Statement by J. C. Hall, Truax-Traer Coal Co., personal interview.
[4]F. H. Reed, G. R. Yohe, O. W. Rees, and H. W. Jackman, Trends in Coal Utilization, Illinois State Geological Survey, Urbana, Illinois, 1947, p.15.
[5]Statement by J. R. Fellows, Department of Mechanical Engineering, University of Illinois, personal interview.

far as Brandon Pool (fig. 34). Here they are divided into smaller tows for movement to their Chicago destination (fig. 35). Slightly more than 80 per cent of the coal that passed through Peoria Locks in 1950 reached the Chicago market (fig. 36). In the same year the 940,000 net tons delivered south of that point were distributed among the zinc and cement plants at La Salle and Oglesby, the glass factory at Ottawa, and the electric power station and chemical factory at Plaines, Illinois, just below Brandon Road Locks.

Peak periods for Illinois Waterway coal traffic are late spring and early fall (fig. 36) and are determined by navigation conditions and use of competitive fuels. The reasons for the double troughs, or periods of reduced traffic, are two-fold. First is the winter closing of at least one set of locks each January

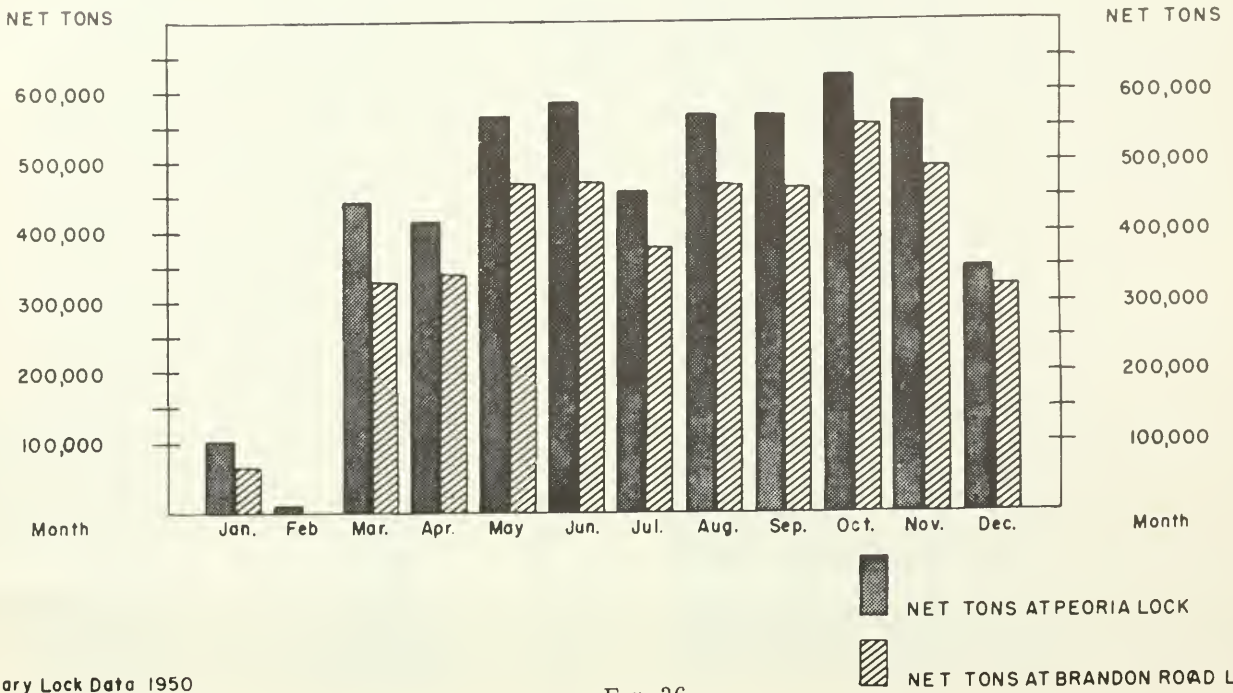
Fig. 34--The "Robert W. Lea" of The Ohio River Company near La Salle pushing nearly 8000 net tons of coal toward Chicago.

Fig. 35--The "Betty M" of The Ohio River Company and the "Sylvia T" of The Central Barge Company in Brandon Pool. The "Betty M" has just turned over to the "Sylvia T" four of eight barges it brought upstream. Carriers frequently cooperate with one another in this manner.

and February for repairs, in combination with difficulties of winter navigation. Second is the increased use of gas in summer at "dump rates" combined with the normal summer decrease in electrical needs. Gas at "off-period prices" is the cheapest kind of fuel.[1] The frequency of strikes combined with an increased cost at the mines has resulted in many large coal users switching to gas or oil. Since 1946 there has been a nearly 37 per cent increase in the number of industrial fuel consumers using oil.[2] Most Commonwealth stations are equipped to burn either oil or gas, in addition to coal.[3] The change to gas by

[1]Bromage, op.cit.
[2]Harold Smith, Chicago Tribune, February 4, 1951, p.2.
[3]Bromage, op.cit.

NORTH BOUND COAL TRAFFIC
ON
THE ILLINOIS WATERWAY - 1950



Premlinary Lock Data 1950
Corps of Engineers, U.S. Army

Fig. 36

jeb

Chicago industries has reached such a proportion that its use exceeded that of coal in 1947 (fig. 37). Especially hard pressed by this development have been the coal distributors.[1] The greatest decreases have been in the consumption of anthracite and bituminous. However, a greater need for the latter as a raw material for manufactured coke and gas has more than offset the drop in its direct use (fig. 37). In spite of these non-coal fuels currently gaining wide acceptance their increasing cost due to the depletion of the nation's reserves will probably force users to eventually return to coal. A continued reliance on bituminous coal augurs well for river traffic as more and more supplies are being drawn from nearby fields rather than eastern sources.[2]

The Chicago Market

In Chicago, river-borne coal is distributed to only a few large users. Ex-barge coal is delivered to six stations of the Commonwealth system, Proctor and Gamble Company, Crerar Clinch Coal Company, Silver Creek Coal Company, Holland Coal Company, Material Service Corporation, Chicago Sanitary District and Acme Steel Corporation (fig. 38). At least two more coal companies are planning to receive coal ex-waterway[3] and at the Chicago Coal and Dock Company (fig. 17) plans are being laid for transhipping to lake vessel.[4] This should provide some competition to the Rail to Water Transfer Corporation currently loading lake vessels. The latter is owned and operated by 28 leading coal mining companies drawing by rail from the Illinois, Indiana, and West Kentucky fields.[5]

---

[1]Holland, op.cit.
[2]Doerr, op.cit., p. 269.
[3]Sanders, op.cit.
[4]Hall, op.cit.
[5]Letter from H. M. Cuson, Rail to Water Transfer Corp., January 24, 1951.

CONSUMPTION OF FUEL, BY KIND,
FOR THE
CHICAGO INDUSTRIAL AREA[a]

		In thousands of tons
Anthracite	1947	143
	1939	43
	1929	212
Bituminous	1947	6009
	1939	13572
	1929	20874
Coke	1947	11228
	1939	5635
	1929	8474
Coal Equivalent of Fuel Oil[b]	1947	4346
	1939	2617
	1929	2361
Coal Equivalent of Natural Gas[c]	1947	509
	1939	822
	1929	Not Available
Coal Equivalent of Manufactured Gas[d]	1947	6724
	1939	4801
	1929	Not Available
Coal Equivalent of Mixed Gas[e]	1947	7172
	1939	433
	1929	Not Available

[a]Data compiled by Harry M. Dixon in an unpublished paper on Illinois Coal Market, Department of Economics, University of Illinois using 16th Census of the United States, Manufacture, 1939, Vol. II, p. 352; Census of Manufactures, 1947, Fuels and Electric Energy Consumed, M. C. 203, pp.133-143.

[b]Conversion made on basis of 4.2 bbls. to a ton of coal.

[c]Conversion made on basis of 25,000 cu. ft. to a ton of coal.

[d]Conversion made on basis of 50,000 cu. ft. to a ton of coal.

[e]Conversion made on basis of 30,000 cu. ft. to a ton of coal.

Fig. 37

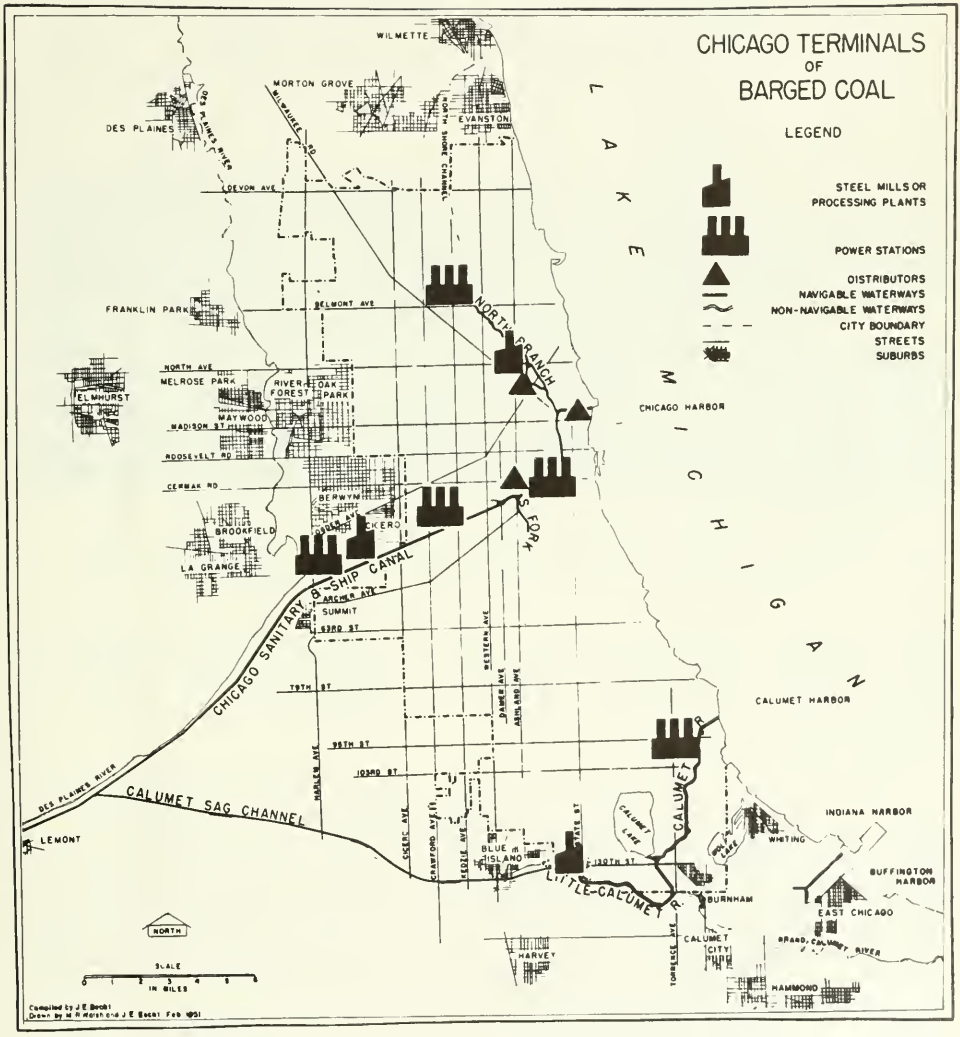

CHICAGO TERMINALS
OF
BARGED COAL
LEGEND
STEEL MILLS OR
PROCESSING PLANTS
POWER STATIONS
DISTRIBUTORS
NAVIGABLE WATERWAYS
NON-NAVIGABLE WATERWAYS
CITY BOUNDARY
STREETS
SUBURBS
LAKE MICHIGAN
WILMETTE
MORTON GROVE
EVANSTON
DES PLAINES
DES PLAINES RIVER
DEVON AVE
FRANKLIN PARK
BELMONT AVE
NORTH BRANCH
CHICAGO HARBOR
NORTH AVE
MELROSE PARK
RIVER FOREST
OAK PARK
ELMHURST
MAYWOOD
MADISON ST
ROOSEVELT RD
CERMAK RD
BERWYN
CICERO
BROOKFIELD
LA GRANGE
S. FORK
CHICAGO SANITARY & SHIP CANAL
ARCHER AVE
SUMMIT
63RD ST
79TH ST
87TH ST
95TH ST
103RD ST
CALUMET HARBOR
CALUMET SAG CHANNEL
LEMONT
HARLEM AVE
CICERO AVE
CRAWFORD AVE
KEDZIE AVE
WESTERN AVE
DAMEN AVE
ASHLAND AVE
STATE ST
BLUE ISLAND
130TH ST
CALUMET R.
LITTLE CALUMET R.
CALUMET LAKE
INDIANA HARBOR
WHITING
BURNHAM
BUFFINGTON HARBOR
EAST CHICAGO
CALUMET CITY
HARVEY
TORRENCE AVE
HAMMOND
GRAND CALUMET RIVER
NORTH
SCALE
0 1 2 3 4 5 6
IN MILES
Compiled by J.E. Bockt
Drawn by M.R. Morshand J.E. Bockt Feb 1951

Fig. 38

The Commonwealth Edison system is by far the greatest consumer of waterway coal. The system burns approximately 9,000,000 net tons annually. At least one-half of this is moved to Chicago via the Chicago and Illinois Midland Railway and loaded into barges at Havana (fig. 24). The coal all comes from mines in the Springfield district. It is from shaft mines and the plants are especially designed to burn this type of coal. Those stations that obtain coal by water, Fisk, Crawford, Calumet, Northwest and Ridgeland (fig. 38), receive from 85 to 90 per cent that way. Closing of the waterway for lock repairs in winter, and strikes are the reasons not all is brought in by water. Storage is large, with the system attempting to maintain a 3,500,000 net ton reserve, enough for 120 days. At both Fiske and Ridgeland more than 500,000 net tons are stockpiled (fig. 39). The scope of the system's operations are such that more than 2000 Illinois miners produce for Edison alone and their output averages more than 30,000 net tons each week day.[1] The barging of coal for the Commonwealth Edison System is an example of how the waterway is especially adapted for intra-organizational commodity movements rather than inter-company shipments.[2]

That receipt of barge coal for utilities will increase is evidenced by the post-war program announced by the Commonwealth Edison system (fig. 40)[3] Of these, only the Waukegan station is situated so as not to be able to use barge coal. Furthermore, the newer units, as the most efficient, will be used most. About a pound and a half of raw Illinois coal is required to produce one kilowatthour in the older stations, while at Ridgeland approximately one pound will

[1]Bromage, op.cit.

[2]This principle of transportation is developed in detail in the section pertaining to iron and steel in Chapter VI.

[3]Ibid.

Fig. 39--Coal handling equipment and stockpile at Ridgeland Station of the Commonwealth Edison system.

be required for the same purpose. This technological process and water transportation are two of the principal reasons electricity costs less today than it did 25 years ago.[1]

Distributors of waterway coal deliver it "all over Chicago and even reach Oak Park and Winnetka"[2] (fig. 38). It costs between ninety cents and one dollar less to bring coal to a riparian yard by barge than by rail. However, this savings is not presently being passed on to the ultimate consumer. Rather the profit broadens operations of the distributor and enables him to handle more volume and to give greater variety to his products. In fact, current blanket pricing

[1]Commonwealth Edison Company, Press release at Ridgeland Station Dedication, December 7, 1950.

[2]Holland, op.cit.

POSTWAR EXPANSION PROGRAM OF THE COMMONWEALTH EDISON SYSTEM[a]

Station	KWH In Service	KWH under Construction	Total KWH	Service Data
Calumet	107,000		107,000	Sept. 1947
Fisk	150,000		150,000	June 1949
Joliet	107,000		107,000	Feb. 1950
Ridgeland	150,000		150,000	Nov. 1950
Ridgeland		150,000	150,000	Summer 1951[b]
Waukegan		110,000	110,000	Summer 1952[b]
Ridgeland		150,000	150,000	1953
Total	514,000	410,000	924,000	

[a]Program Ridgeland Station Dedication, December 7, 1950.
[b]Estimated.

Fig. 40

policies make it impossible to give the savings to the final buyer.[1] For instance, five of Chicago's largest coal retailers are located within five blocks of one another; without a blanketing price system four would be forced out of business.[2]

Although barge coal can be transported and unloaded more cheaply than rail coal, there are certain disadvantages. As has been pointed out, coal currently shipped via barge is of limited use. Also, during the period of greatest need, January 15 to March 1, the waterway is closed for lock repairs, or shipments are reduced due to uncertainties of navigation. Furthermore, even though barges can be unloaded at less than 70 per cent of the cost of that delivered by rail[3] it requires a far greater initial outlay of capital.[4] This initial investment must include not only the expensive unloading machinery but also storage space (fig. 39).

---

[1]Holland, op.cit.
[2]Ibid.
[3]Holland, op.cit.
[4]Letter from J. M. Mercer, Asst. Civil Engineer, The Chicago Sanitary District of Chicago, January 5, 1951.

Traffic Potential

The greatest potential increments in barge coal traffic lie in shipments from Southern Illinois producing districts. That barge transportation will be used to move a large percentage of the nearly 30,000,000 tons annually produced within a distance of 75 miles of Chester appears certain. More than 8,000,000 net tons of this coal already move to Chicago, and the present trend is upward.[1]

The continued use of eastern coals, especially during World War II, has seriously reduced those reserves of the better coking coals.[2] Many of the remaining eastern coals used in Chicago are not only higher in sulphur and ash content than are those Illinois coals used in the St. Louis area but are also increasing more rapidly in ash in relation to Illinois coals available by barge.[3] Therefore, the grade of Illinois coal is higher in relation to eastern coals than has been the case in the past. As Illinois has the greatest reserve of high-volatile bituminous coal of any state east of the Rocky Mountains[4] increased future shipments appear assured even though most of Illinois coal is too high in sulphur content to be considered for coke production at present. Furthermore, recent experiments point to methods of not only removing the sulphur economically but of utilizing the sulphur as well.[5] The principal low-sulphur coal area is centered in Franklin County, only forty-five miles from Ford, Illinois.[6] Another important characteristic of these coals is that they can be safely stockpiled after sizing and washing for periods of from three to six months.

---

[1]Cady, op.cit.

[2]F. H. Reed, H. W. Jackman, O. W. Rees, G. R. Yohe and P. W. Henline, "Use of Illinois Coal For Production of Metallurgical Coke", Illinois State Geological Survey, Bulletin No. 71, Urbana, Illinois, 1947, p.13.

[3]Ibid.

[4]Reed and others, op.cit., p.13.

[5]Cady, op.cit.

[6]Reed and others, op.cit., p.13.

[7]Ibid., p.11.

This will permit a relatively long in-transit period. The greatest disadvantage, it should be re-emphasized, is that precautions will have to be taken to prevent breakage of sized-coals for best coking results.

The total annual tonnage of Illinois coal eventually to be carried on the Illinois Waterway should be more than double the present traffic. Barge loading plants so located as to tap the better coals of Southern Illinois will result in large annual increments in waterway tonnages. The growth will perhaps be slow, but it appears certain. As transport equipment and transhipping and terminal facilities are built, coals for domestic stokers, industrial heating, gas, coke, metallurgical coke and electric generating uses in the Chicago area can be expected to reach a minimum annual total of 12,000,000 net tons--approximately one-third of the entire Chicago market.

B. SAND AND GRAVEL

Introduction

The differing patterns of waterway traffic in construction sand and gravel and in higher quality silica sand illustrate the delicacy of balance between those commodities which can be profitably hauled by barge and those that cannot, except under a special set of circumstances. Sand and gravel are of relatively low value and are bulky and they necessitate either a low freight rate or a source convenient and readily accessible to its market, or a combination of these factors. Silica sand, on the other hand, is relatively more costly and moves in less volume, therefore is not especially adapted to water transport.

The huge Chicago market finds a convenient source and low rate along the waterway for sand and gravel and as a result approximately 15 per cent of all that produced in Illinois is transported by barge. In 1947, 12,810,757 net tons were produced in the state[1] of which 1,809,032 net tons, or slightly over 14 per cent, were barged.[2] In 1948 the corresponding figures were 15,091,677,[3] 1,935,660,[4] and 13 per cent. In 1949 the total moving by barge had risen to almost 2,800,000 net tons, an annual increase of nearly 45 per cent, and preliminary data for 1950 indicates an increase to nearly 3,000,000.[5]

This concentration of sand and gravel activity along the Illinois Waterway is the result of a unique combination of factors which become all the more

---

[1]Voskuil, op.cit., p.63.
[2]Letter from the American Waterway Operators, Inc., Washington, D.C., August 9, 1950.
[3]Voskuil, op.cit., p.63.
[4]American Waterway Operators, op.cit.
[5]Letter from L. A. Behrle, Chicago Gravel Co., January 10, 1951.

evident when the ubiquitous nature of Illinois sand and gravel deposits is recognized. Most of the commercial grade sand and gravel in Illinois is of glacial origin and occurs principally in outwash plains, or terrace remnants or valley fillings. Deposits are most abundant in the northeastern part of the state; especially large are those of the Fox, Rock and Illinois River valleys. However, production occurs throughout the state along streams, especially in the Mississippi and Ohio River valleys, as well as in deposits of brown or white chert in Southern Illinois. In addition, sand is delivered to Chicago by lake vessel. In order of volume, the carriers moving sand and gravel to Chicago are barge, rail, lake vessel, and truck. Of this nearly 75 per cent is barged in and another 10 per cent arrives by lake vessel from the Indiana and Michigan shores.

Origins

The three factors, low rate, accessible deposits and large market, worked together along the Illinois Waterway to effect the current volume, making sand and gravel second in tonnage of all commodities moving on it. The rate from Rockdale--immediately south of Joliet and on the waterway--to Chicago, is forty-one cents per ton by barge. The corresponding rate for single line rail hauls is seventy-two cents; and, for delivery on connecting lines it is ninety-four cents.[1] Sand can be barged to Chicago from Liverpool (fig. 41) under a tariff less than the rail rate from Joliet. The Illinois River deposits have the advantage of costing only the labor of dredging, washing and screening with an inexhaustible supply of water. The Chicago market requires approximately 4,000,000 net tons annually.[2] Lake sand is transferred at Calumet Harbor

[1]Letter from L. A. Behrle, Chicago Gravel Co., January 10, 1951.
[2]Letter from Arnold Sobel, Manager, Marine Division, Material Service Corporation, March 16, 1951.

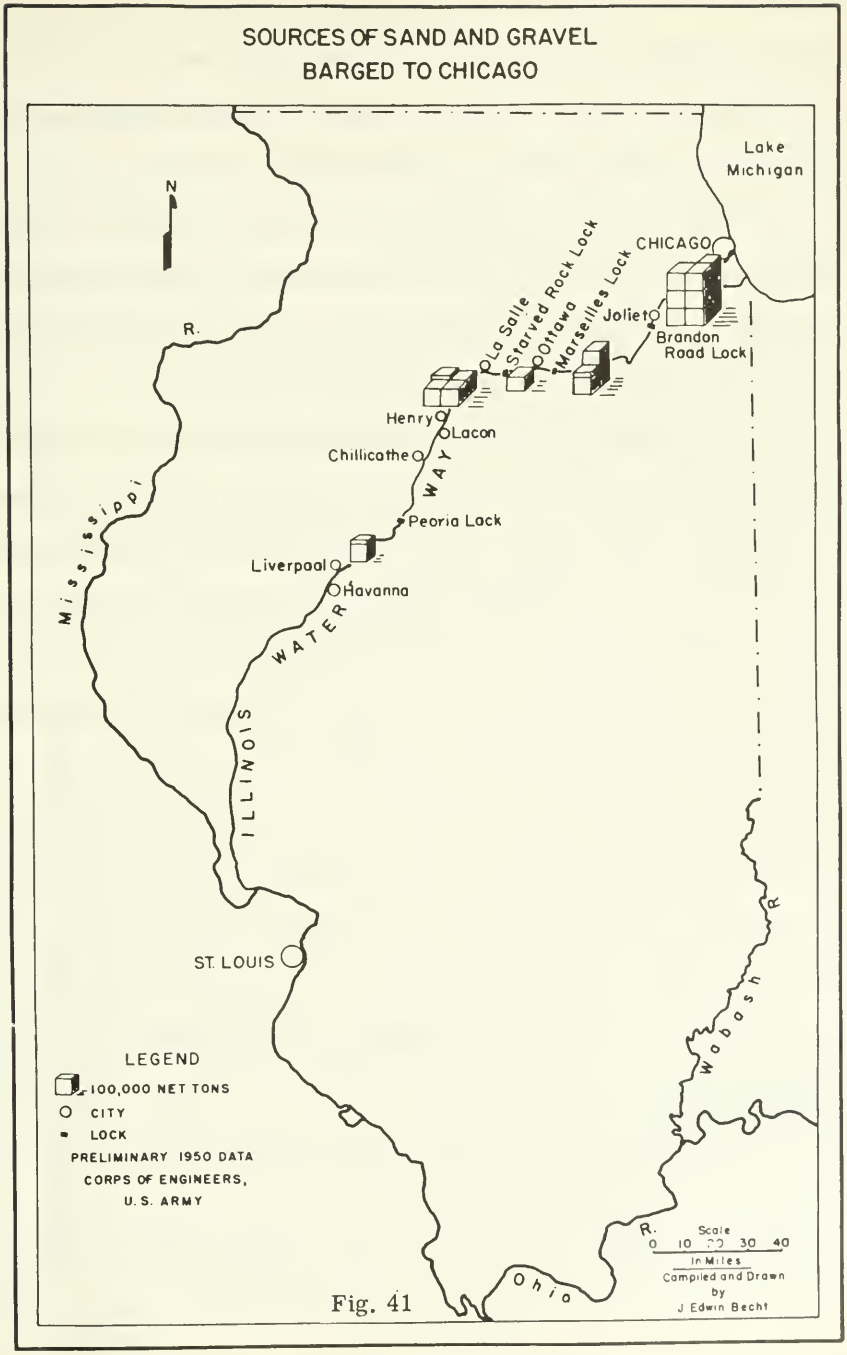

SOURCES OF SAND AND GRAVEL
BARGED TO CHICAGO
Lake
Michigan
N
CHICAGO
Joliet
Brandon
Road Lock
Marseilles Lock
Starved Rock Lock
La Salle
Ottawa
Henry
Lacon
Chillicathe
WAY
Peoria Lock
Liverpool
Havanna
WATER
ILLINOIS
Mississippi
R.
ST. LOUIS
Wabash R.
Ohio R.
LEGEND
100,000 NET TONS
CITY
LOCK
PRELIMINARY 1950 DATA
CORPS OF ENGINEERS,
U.S. ARMY
Scale
0 10 20 30 40
In Miles
Compiled and Drawn
by
J Edwin Becht

Fig. 41

Terminals and railed to the yards of one large distributor.[1] Other distributors transport it similarly from other docking points but, as deep water is needed, they are restricted to points relatively close to the lake in comparison to distributors of sand brought upstream in craft drawing only nine feet, or less, of water. In 1947 approximately 250,000 net tons reached Chicago by lake vessel in contrast to nearly 1,250,000 that arrived ex-barge.[2] Of this less than 20 per cent was gravel. The demand has increased at such a rate that the chief factor now limiting this traffic is the lack of transport facilities.[3]

As a result of the above favorable combination of factors, sand and gravel are produced for Chicago at numerous locations along the Illinois Waterway. Production extends from Liverpool northward to Lockport, five miles north of Joliet (fig. 41). The Material Service Corporation, barging more than 1,500,000 net tons into Chicago in 1948,[4] operates one of the largest riparian sand and gravel producing plants at Lockport. At Rockdale, immediately south of Joliet, the Chicago Gravel Company works a huge plant and loading dock. They do not operate their own shipping equipment but sell f.o.b. barge, rail or truck at their plant.[5] Below Rockdale, Material Service Corporation is still the leading producer. Consumers' Company, Illinois Sand and Gravel--at Henry--Liverpool Materials Company--at Liverpool--and other producers contribute important tonnages to the total volume barged. Material Service dredges various types of

---

[1]Olson, op.cit.

[2]Office of the Chief of Engineers, Department of the Army, "Commercial Statistics Water-Borne Commerce of The United States For the Calendar Year 1947", Washington, D.C., 1949, pp.792-799.

[3]Letters from Herman Raster, Liverpool Materials Co., December 19, 1950; and Behrle, op.cit.

[4]Corps of Engineers, U.S. Army, "Record of Public Hearing and Duplicate Locks", Illinois Waterway, Chicago, August 19, 1949, p.66.

[5]Behrle, op.cit.

construction sands in the Illinois valley between Marseilles and Brandon Road locks, and draw sand from as far away as Chillicothe and Liverpool (fig. 41). They also own extensive holdings near Henry (fig. 41) for future development.[1] The Consumers' Company moves sand and gravel produced along the river in the vicinity of Lacon (fig. 41) to two Chicago locations (fig. 42).[2]

From Lacon southward the combined cost of transportation and handling exceeds the value of sand on board barge in Chicago. The rate to the south branch of the Chicago River (fig. 42) is sixty-one cents a net ton and to the Calumet Harbor area (fig. 42) sixty-three cents.[3] The value of a net ton of sand aboard barge in Chicago is about sixty cents.[4] To understand why sand is transported in spite of these cost factors, it is necessary to understand that sand is handled by building materials distributors as a service item. That is, it is a sales medium for cement, rock, coal and other building materials. Especially has this been true since the wide adoption of ready-mixed cement. As previously pointed out, the rail rate from Joliet to Chicago is at least 72 cents, and although rail sand in Chicago is usually worth more a ton than barge sand, here, too, in the final analysis the profit margin is made on sales of products other than sand.[5] So when compared with even short-haul rail movements, river deposits as far south as Liverpool are favorably situated.

There is still another reason for a movement of sand to Chicago from locations south of Lacon. From the standpoint of producers in that area barge transportation provides an outlet for a commodity for which there is no local

---

[1]Statement by Sobel, op.cit., personal interview.
[2]Letter from J. M. Michaels, Consumers' Co., December 19, 1950.
[3]Ibid.
[4]Sobel, op.cit.
[5]Sobel, op.cit.

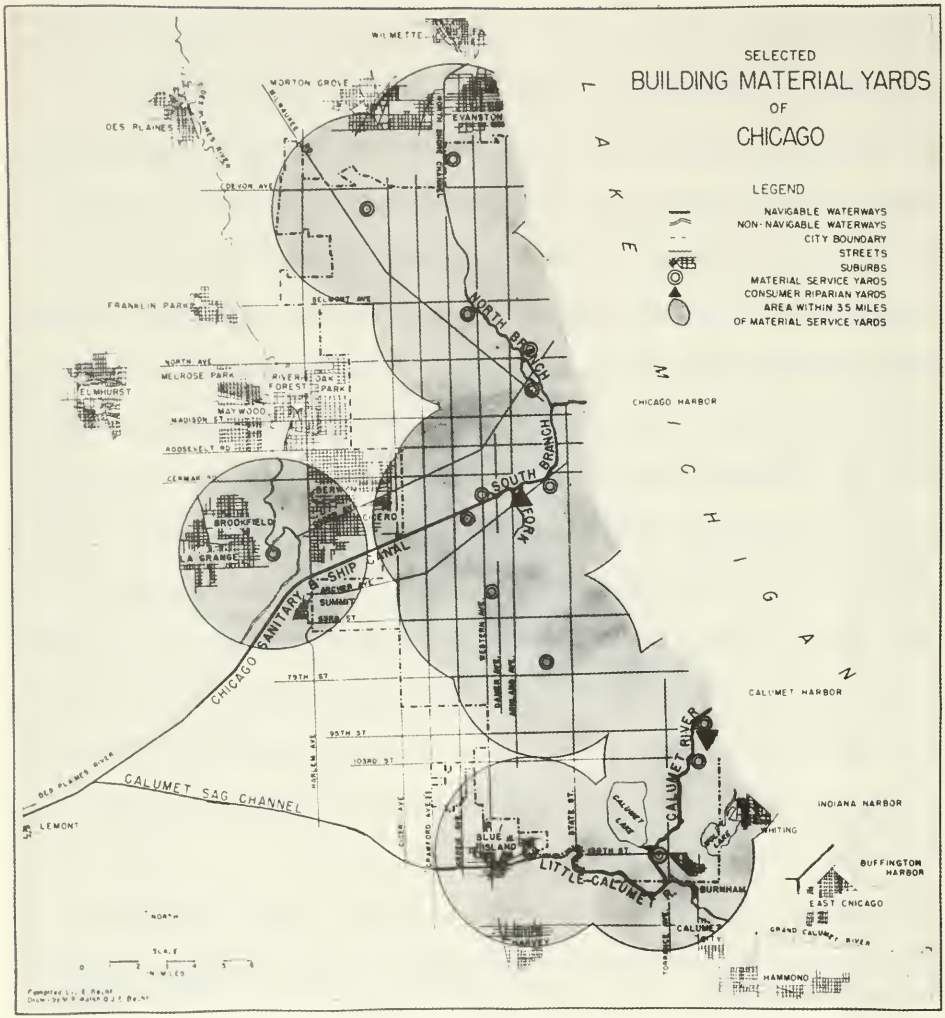

SELECTED
BUILDING MATERIAL YARDS
OF
CHICAGO
LEGEND
NAVIGABLE WATERWAYS
NON-NAVIGABLE WATERWAYS
CITY BOUNDARY
STREETS
SUBURBS
MATERIAL SERVICE YARDS
CONSUMER RIPARIAN YARDS
AREA WITHIN 35 MILES
OF MATERIAL SERVICE YARDS
LAKE MICHIGAN
WILMETTE
MORTON GROVE
EVANSTON
DES PLAINES
DEVON AVE
FRANKLIN PARK
BELMONT AVE
NORTH BRANCH
NORTH AVE
MELROSE PARK
RIVER FOREST
OAK PARK
ELMHURST
MAYWOOD
MADISON ST
ROOSEVELT RD
CERMAK RD
BERWYN
CICERO
BROOKFIELD
LA GRANGE
SOUTH FORK
CHICAGO HARBOR
CHICAGO SANITARY & SHIP CANAL
ARCHER AVE
SUMMIT
63RD ST
79TH ST
95TH ST
103RD ST
CALUMET HARBOR
CALUMET RIVER
DES PLAINES RIVER
CALUMET SAG CHANNEL
LEMONT
HARLEM AVE
CICERO AVE
CRAWFORD AVE
STATE ST
CALUMET LAKE
INDIANA HARBOR
WHITING
BLUE ISLAND
130TH ST
LITTLE CALUMET
BURNHAM
BUFFINGTON HARBOR
EAST CHICAGO
CALUMET CITY
GRAND CALUMET RIVER
HARVEY
HAMMOND
NORTH
SCALE
IN MILES

Fig. 42

market. They are in the business of producing road gravel and washed and graded gravel and sand for nearby markets. In the process of producing gravel, large amounts of sand in excess of immediate requirements are handled. Thus, though the profit margin is very small, if it were not sold it would be in the way of continued operations and eventually would have to be handled a second time to get it out of the way.[1] Their greatest difficulty, at present, is to obtain barges for shipping, not in production or rates.

Traffic Pattern

Traffic in sand and gravel is seasonal. In response to the seasonal nature of the building trades the movement of sand occurs primarily during the summer months (fig. 43). Even in December of 1950 when it was known Brandon Road locks were soon to be closed for repairs, the tonnage dropped to less than one-half that of July, the peak month. In view of this great seasonal fluctuation it is understandable that a shortage of barges might, at times, be the limiting factor. The excessive cost of maintaining a fleet sufficiently numerous for the peak season only to have much of it idle for six months is prohibitive. Furthermore, equipment demands for other kinds of commodities are also at a peak during the late spring, summer, and early fall. Traffic in sand from Liverpool is heaviest from March through July and reflects this seasonal availability of barges, as well as an abundance of sand accumulated while preparing a stock-pile of gravel for summer road building.[2]

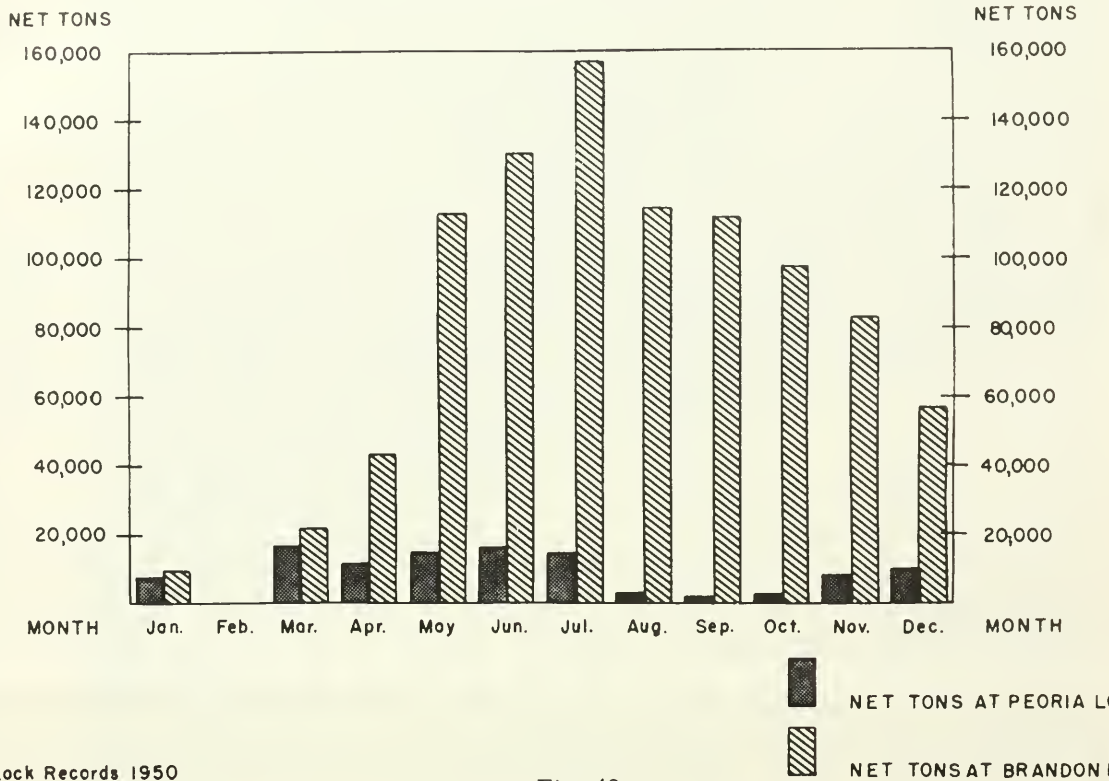
Chicago Market

In Chicago, sand and gravel are barged to more than twenty "stations".

---

[1]Raster, op.cit.
[2]Raster, op.cit.

NORTH BOUND SAND AND GRAVEL ON THE ILLINOIS WATERWAY - 1950



Preliminory Lock Records 1950
Corps of Engineers, U.S. Army

Fig. 43

jeb

Trucking from the water's edge is such a great part of the cost that a mile, or just a little more, will often determine whether or not a distributor can bid successfully on a job.[1] One distributor is able to compete anywhere within the city by having thirteen riparian yards, three inland yards and two producing plants (fig. 42).[2] The greatest distance separating two adjacent stations is approximately seven miles, and practically all of Chicago, and much of the surrounding suburbs as well, falls within a three and one-half mile radius of one of the stations (fig. 42). Therefore, it can be reasoned that competiton can be met within that radius. Between that distance and six miles, success depends on the location of competitors, the volume required by any certain project, and the road network. Beyond six miles it is only profitable if there is a lack of rail supply points, or under conditions imposed by a "moving enterprise", such as the construction of a highway.

Potential

Sand and gravel traffic are growing rapidly. The tonnage of sand and gravel carried on the waterway has increased more than three-fold since 1943 (fig. 44). The three main factors in this growth have been 1) the post-war building boom, 2) the wide adoption of a building technique using ready-mixed cement,[3] and 3) the consolidation into a single organization of two large

---

[1] Sobel, op.cit.

[2] Ibid.

[3] Ready-mixed cement is prepared at strategically located plants and then distributed to various consumers. This has resulted in a more uniform demand for bargeload quantities of sand at certain stations rather than sporadic demands according to the needs of any one construction project. Formerly the flexibility of transportation required in the marketing of sand meant that rail cars and trucks were best suited. Currently, this flexibility is provided by trucks from the cement mixing plant. The mixing plant simultaneously fills orders for many construction projects, therefore requires greater volumes of raw materials, thus intensifying the adaptability of barge transport for sand traffic.

distributors.[1] The first accounts for much of the increase in 1946 and 1947 but the last two help to explain the 850,000 net ton increase from 1948 to 1949[2] and an anticipated increase for 1950. Further increments will also be influenced by efforts put forth by other companies to parallel the operations of the two leading distributors--the Material Service Corporation and the Consumers' Company.

There are certain disadvantages in river-canal transportation of sand and gravel. In brief, the first disadvantage is the high cost of constructing and maintaining loading and unloading facilities (fig. 45). These usually require heavier equipment than either rail or truck because of the volume entailed. A second disadvantage is the uncertainty of the service which is more or less irregular and influenced by the supply of barges. Larger distributors solve this by operating their own equipment or by maintaining large stockpiles. Smaller companies are less able to do either of these, hence have a need for a highly flexible transport system and can best be served by rail or truck.

The main advantages of sand and gravel water transport are the lower transportation charges, the accessibility of docks at destinations where specific projects are under construction, and the tapping of sources without rail or truck service. As previously stated the Consumers' Company Lacon production is an example of the latter.

Silica Sand

The transportation pattern of silica sand differs from that of construction sand and gravel in many respects. It is used almost entirely for industrial purposes and in 1948 less than one per cent of that sold or used by producers in

---

[1]Material Service Corp. and Construction Aggregates Co.
[2]Sobel, op.cit.

ILLINOIS WATERWAY TRAFFIC
IN
SAND AND GRAVEL "1943-1949"[a]

Year	Net Tons
1943	871,591
1944	737,502
1945	742,730
1946	1,213,669
1947	1,809,032
1948	1,935,660
1949	2,795,060[b]

[a]American Waterway Operators, Washington, D.C.
[b]Preliminary Data, Corps of Engineers, U.S. Army

Fig. 44

Fig. 45--California Yards of The Material Service Corporation. Notice construction work underway, November 1950.

Illinois was for construction work.[1] Of the 2,504,500 net tons[2] produced in that year less than one-half of one per cent was transported by barge. The 90,000 net tons thus carried was moved by one company and this only because a particularly high grade deposit they are working is not near a railroad, and it does not appear economically feasible to construct a railroad to that deposit.[3] This company dredges silica from Bulls Island, located in the Illinois River one-half mile east of Ottawa (fig. 41). It is reported to be one of the finest deposits in the world, ranging from 97 to 99 per cent pure, and containing only a fraction of one per cent iron oxide.[4] This company ships from 5 to 10 barges to Chicago each month, depending on the market and time of year.[5] Although there are four other large producers of silica working deposits within one mile of the waterway they all ship by rail or truck.

There are four main reasons for the current lack of silica traffic on the Illinois River. The first is a need for cleanliness. Cleanliness is essential because glass manufacturing and steel molding are the chief uses of the product. Less important uses are sand blasting, flour for domestic and industrial cleansers, ceramics, cement testing and roofing. In all but the last cleanliness is necessary. Especially in glass manufacturing is there a need for silica to be kept free of dirt because impurities in the silica result in discoloration of the product. Also, in all uses a nearly uniform product is essential. Therefore, most silica is shipped under cover following washing and screening near its source, and though it can be shipped in covered barges the additional precautions required in transshipping operations are excessive in cost.

---

[1]Voskuil, op.cit., p.59.
[2]Ibid.
[3]Statement by Allen Kline, Ottawa Hydraulic Silica Co., personal interview.
[4]Ibid.
[5]Ibid.

The second reason silica sand is not barged is its value. Silica is priced from four to six times higher than construction sand. In 1948 a ton of silica on a rail car in Chicago had a value ranging from $4.03 to $6.04. This contrasts to a range from 60 cents to $1.10 for construction sands. Therefore a longer time in transit requires a relatively higher capital investment. Also, due to its value, losses due to weathering, wind, and transhipping must be kept to a minimum.

The third reason silica sand is not widely barged is that the volume required by average using plants is too small for water movements. In addition, the erection of special dock facilities is too costly for the required volume by the typical consumer. Therefore, all silica shipped into Chicago by barge is transhipped to either rail or truck for plant delivery. Small firms buy by the truckload, large firms by the carload, a 60-ton carload constituting a large shipment.

The fourth reason for lack of silica movements on the waterway is the rate structure. The rail rate structure deters the barging of silica sand to Chicago because the Ottawa rate applies on any shipment beyond the "Chicago Switching District". The barge rate is 62 cents a ton from Ottawa to Chicago.. The tariff by rail is $1.82 a net ton in open cars, $2.36 in closed cars. At first glance it would seem that rate-wise barge shipments held the advantage. However, on all sand sent to factories outside the Chicago Switching District the Ottawa rates apply. This means on all silica sand railed from Chicago the rate is computed as though the shipment was originating at Ottawa. Therefore, on all such shipments the 62 cents it cost to barge the silica sand to Chicago must be counted as overhead unless delivered within the Switching District. Because of this the rate structure limits the shipment of barged silica almost entirely to

customers within the Chicago Switching District. Rail rate increases have cut this competition almost in half percentage-wise within the last five years, and if the trend continues, water transportation is expected to be able soon to compete rate-wise on more nearly equal terms.[1]

In brief, current construction will enable barge operators to cope with a growing traffic in sand and gravel. This growing traffic is the result of easily worked deposits favorably located with respect to the Chicago market, rate advantages, and demand. The demand appears assured for at least a decade due to planned construction. Such construction would be super-highways, slum clearance projects and housing needs, in addition to the current defense efforts. In the light of this combination of factors it seems safe to estimate Illinois Waterway traffic in sand and gravel will amount to a minimum annual total of 3,500,000 net tons by 1960.

---

[1]Ibid.

C. PETROLEUM

Introduction

The transportation of petroleum and its products holds an important and unique position in Chicago's incoming traffic pattern. Petroleum is a natural resource found in quantity only in limited locations and therefore its transportation is of especial significance to large consuming areas dependent on distant sources. In 1948 the Chicago metropolitan area consumed approximately 4 per cent of the nation's gasoline production and nearly 5 per cent of its heating fuel.[1] Over 10 per cent of all industrial and domestic fuel used in that year were petroleum products.[2] Since that year the use of heating oils in Chicago has increased over 30 per cent.[3] Yet the nearest large source of petroleum is almost 500 miles away. Chicago's urban functions are dependent on a reliable source and a low-cost transport system capable of handling great fluctuations in volume.

Pipeline and barge are the two chief modes of transporting petroleum and its products to Chicago. These two modes of transport deliver more than 90 per cent of all petroleum products to the Chicago area,[4] and of this total pipe lines normally account for approximately three-fourths.[5] Although shipments do come in by tank car and truck the greatest use of these two latter mediums

---

[1]Estimates based on Department of Commerce, Transportation Division, Industry Report, Domestic Transportation, Petroleum Transportation, Washington, D.C., March 1949, p.20.

[2]Dixon, op.cit.

[3]Harold Smith, "Coal Strikes Force Industry To Turn To Oil", Chicago Tribune, Feb. 4, 1951, p.2.

[4]Statement by A. M. Lord, American Petroleum Institute, Washington, D.C., personal interview.

[5]Statement by Herman N. Meyer, Globe Oil and Refining Co., personal interview.

has been in distributing refined products from Chicago barge and pipeline terminals.[1] In the short span of seven years, from 1943 to 1950, petroleum traffic on the Illinois Waterway has doubled (fig. 46).

MOVEMENT OF CRUDE OIL AND PETROLEUM PRODUCTS ON THE ILLINOIS WATERWAY

Year	Net Tons
1943	1,149,593[a]
1944	870,920[a]
1945	709,736[a]
1946	1,028,994[a]
1947	1,661,831[a]
1948	2,840,090[a]
1949	2,835,053[b]
1950	2,286,785[c]

[a]American Waterways Operators, Inc.
[b]Corps of Engineers, U.S. Army.
[c]Preliminary--based on 1950 lock reports to Corps of Engineers, U.S. Army.

Fig. 46

Origins

Petroleum shipments for the most part move upstream from Texas, Louisiana, and Arkansas or begin at refineries at Wood River, Illinois. Of the total barged into the Mississippi District No. 2, (Illinois, Indiana, and Kentucky which include the Hartford and Wood River refineries) 52 per cent originated from Texas points, 27 per cent from Louisiana terminals and 21 per cent from Arkansas and Mississippi.[2] Refineries at Texas City, Freeport, Houston, Beaumont, and Port Arthur, Texas at Destrehan, Norco, Lake Charles, and Baton Rouge,

---

[1]Ibid.
[2]Department of The Interior, Oil and Gas Division, Monthly Summaries of Tanker and Barge Commercial Shipments In Barrels From The Gulf Coast, Washington, D.C., January-December 1950.

Louisiana, at Helena, Arkansas, and at East St. Louis, Hartford, and Wood River, Illinois are the leading origins of products shipped to Chicago by water (fig. 47). In addition shipments are made from numerous other refineries in Texas and Louisiana. Helena, Arkansas is the terminus of pipe line project No. 5 that taps the East Texas and Arkansas oil fields; the refineries at East St. Louis and Wood River receive supplies from the Mid-Continent field. Some Venezuelan and Caribbean petroleum reaches Chicago via Louisiana refineries. This source is likely to become of greater importance to the Mid-West as an increasing volume of imports reach the east coast of the United States from the Middle East, thereby displacing oils from the Caribbean area.[1]

The Illinois Waterway alone is an important petroleum artery. Petroleum traffic on the Illinois Waterway in 1949 made up one-fifth of the total petroleum traffic on the Mississippi River and tributaries.[2] In 1950 more than one-fourth of the Mississippi system petroleum products tonnage also moved on the Illinois.[3] Although these figures are valuable for purposes of establishing relative traffic density they fail to indicate one of the complexities of the petroleum industry, in that they do not show that large quantities of crude oil arrive at East St. Louis and Wood River by pipe line as well as barge. A large part that arrives by barge continues to Chicago by pipe line and much of that received by pipe line may reach Chicago by water.[4]

---

[1]Department of Commerce, "Industry Report", op.cit., p.12.

[2]Department of Commerce, ibid., p.53, and American Waterways Operators, Inc., op.cit.

[3]Estimate based on Department of Interior Summaries, op.cit. and Preliminary lock reports of the Corps of Engineers, U.S. Army.

[4]Letters from Myron O. Johnson, Phillips Petroleum Co., J. A. Abbott, Shell Oil Co., C. C. Baumgardner, Socony-Vacuum Oil Co., Inc. and R. W. Fyfe, Standard Oil Company.

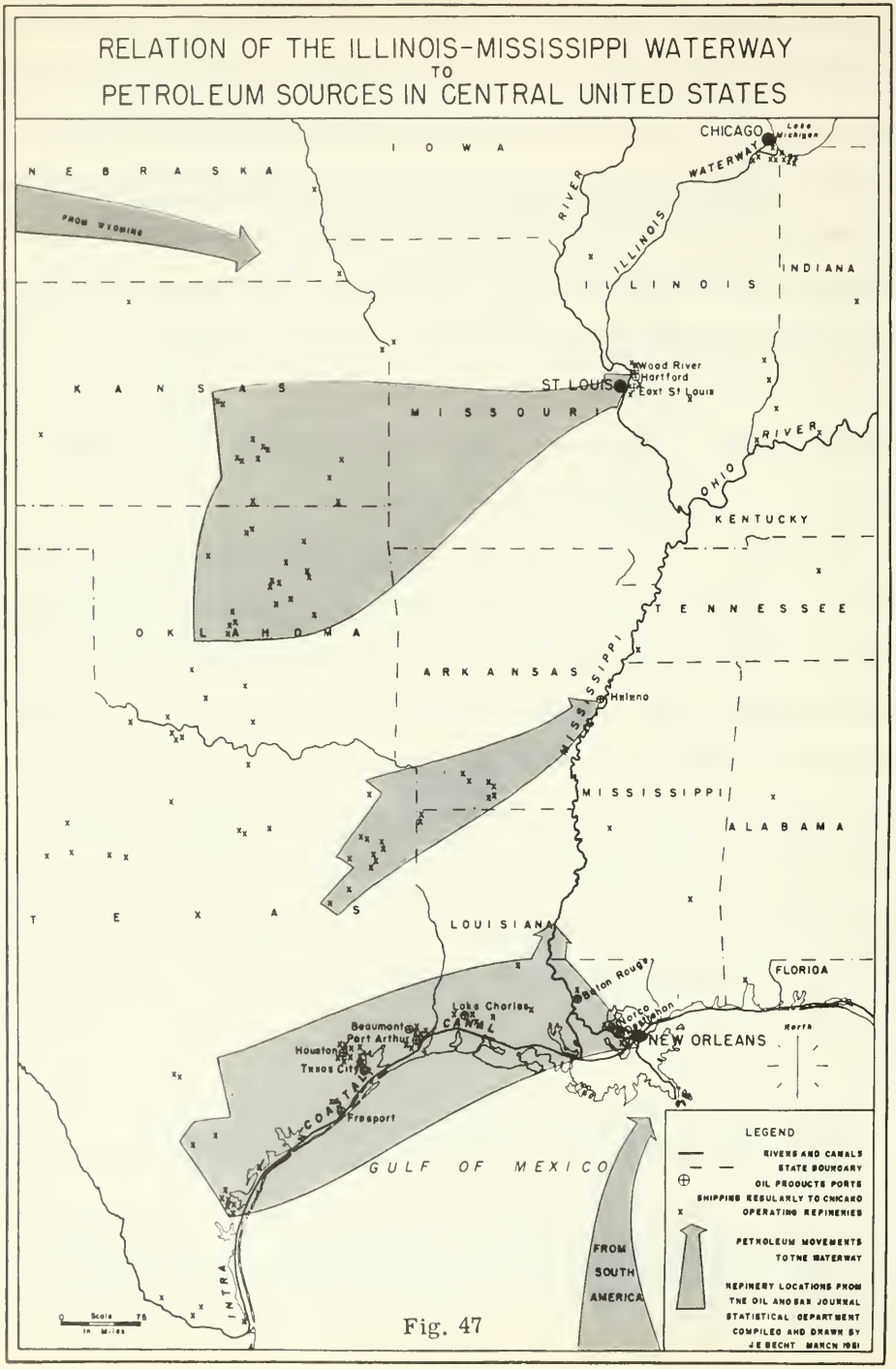

RELATION OF THE ILLINOIS-MISSISSIPPI WATERWAY
TO
PETROLEUM SOURCES IN CENTRAL UNITED STATES
CHICAGO
Lake Michigan
WATERWAY
ILLINOIS RIVER
IOWA
NEBRASKA
FROM WYOMING
INDIANA
ILLINOIS
KANSAS
MISSOURI
ST LOUIS
Wood River
Hartford
East St Louis
OHIO RIVER
KENTUCKY
TENNESSEE
OKLAHOMA
ARKANSAS
MISSISSIPPI
Helena
MISSISSIPPI
ALABAMA
TEXAS
LOUISIANA
FLORIDA
Baton Rouge
Lake Charles
Beaumont
Port Arthur
Houston
Texas City
Freeport
NEW ORLEANS
North
INTRACOASTAL CANAL
GULF OF MEXICO
FROM SOUTH AMERICA
Scale
In Miles
LEGEND
RIVERS AND CANALS
STATE BOUNDARY
OIL PRODUCTS PORTS
SHIPPING REGULARLY TO CHICAGO
OPERATING REFINERIES
PETROLEUM MOVEMENTS TO THE WATERWAY
REFINERY LOCATIONS FROM THE OIL AND GAS JOURNAL
STATISTICAL DEPARTMENT
COMPILED AND DRAWN BY
J.E. BECHT MARCH 1951

Fig. 47

Character of the Traffic

The ability to transport a wide variety of products in volume is one of the chief advantages of water transportation that makes it especially adaptable to the petroleum industry. Principal commodities forming this Illinois Waterway traffic are gasoline, fuel oil, and kerosene (fig. 48). Some of the leading refined products in addition to the three above are benzol, bunker oil, naphtha, gas oil, lubricating oils, road oil, asphalt, and a wide variety of distillates and refined oils. Very little crude oil reaches Chicago by barge (fig. 49), in spite of the presence of eleven large refineries within Greater Chicago (fig. 51). This is due, as will be pointed out, to certain rate and operational benefits of pipe lines as compared to barge. In 1948 the crude total was only 113,699 net tons;[1] and this is the only year in which the total exceeded 100,000 net tons.

Petroleum and its products move primarily northward on the Illinois Waterway but there is some backhauling--southward (fig. 50). In 1950, 1,918,245 net tons moved through Brandon Road lock upbound--northward, while only 368,540 or 19 per cent as much moved downbound. Most of the downbound products were gasoline and diesel fuel, much of which was shipped beyond the Illinois River--into the Mississippi River--as indicated by the downbound tonnage at the New La Grange locks.[2] (fig. 53).

Approximately two-thirds of the upstream flow of petroleum products reaches Chicago, one-third is delivered enroute--chiefly to Peoria and Peru.[3] From Peru the Wood River Oil and Refining Company, Incorporated operates a 67-mile pipe line to Rockford. Smaller riparian terminals distribute their

---

[1]American Waterways Operators, Inc., op.cit.
[2]Corps of Engineers, U.S. Army.
[3]Nina T. Hamrick, "The Illinois Waterway", Current Economic Comment, Vol. 12, No. 1., University, Urbana, Ill., Feb. 1950, p.31.

PETROLEUM PRODUCTS TRANSPORTED
ON
THE ILLINOIS WATERWAY, 1948*

Type	Net Tons
Gasoline	1,625,939
Fuel oil	807,733
Kerosene	222,849
Benzol	28,312
Petroleum oils refined	14,373
Distillate	13,970
Bunker oil	13,704
Refined petroleum products refined	10,833
Naphtha	7,225
Gas Oil	5,718
Total	2,750,656

*American Waterways Operators, Inc.

Fig. 48

CRUDE OIL BARGED INTO CHICAGO

Year	Net Tons	Per Cent of all Inbound Petroleum Traffic
1943	1,103[a]	.009
1944	19,441[a]	.022
1945	52,804[a]	.074
1946	---[a]	---
1947	4,515[a]	.003
1948	113,699[a]	.040
1949	13,906[b]	.006

Source: [a]American Waterways Operators, Inc.
[b]Corps of Engineers, U.S. Army.

Fig. 49

products far inland. From Havana, Illinois for example, such cities as Charleston, Champaign, Dixon and Rankin, Illinois are reached by truck, all more than 100 miles distant.[1]

[1]Statement by Albert Hennecke, Street Towing Co., personal interview.

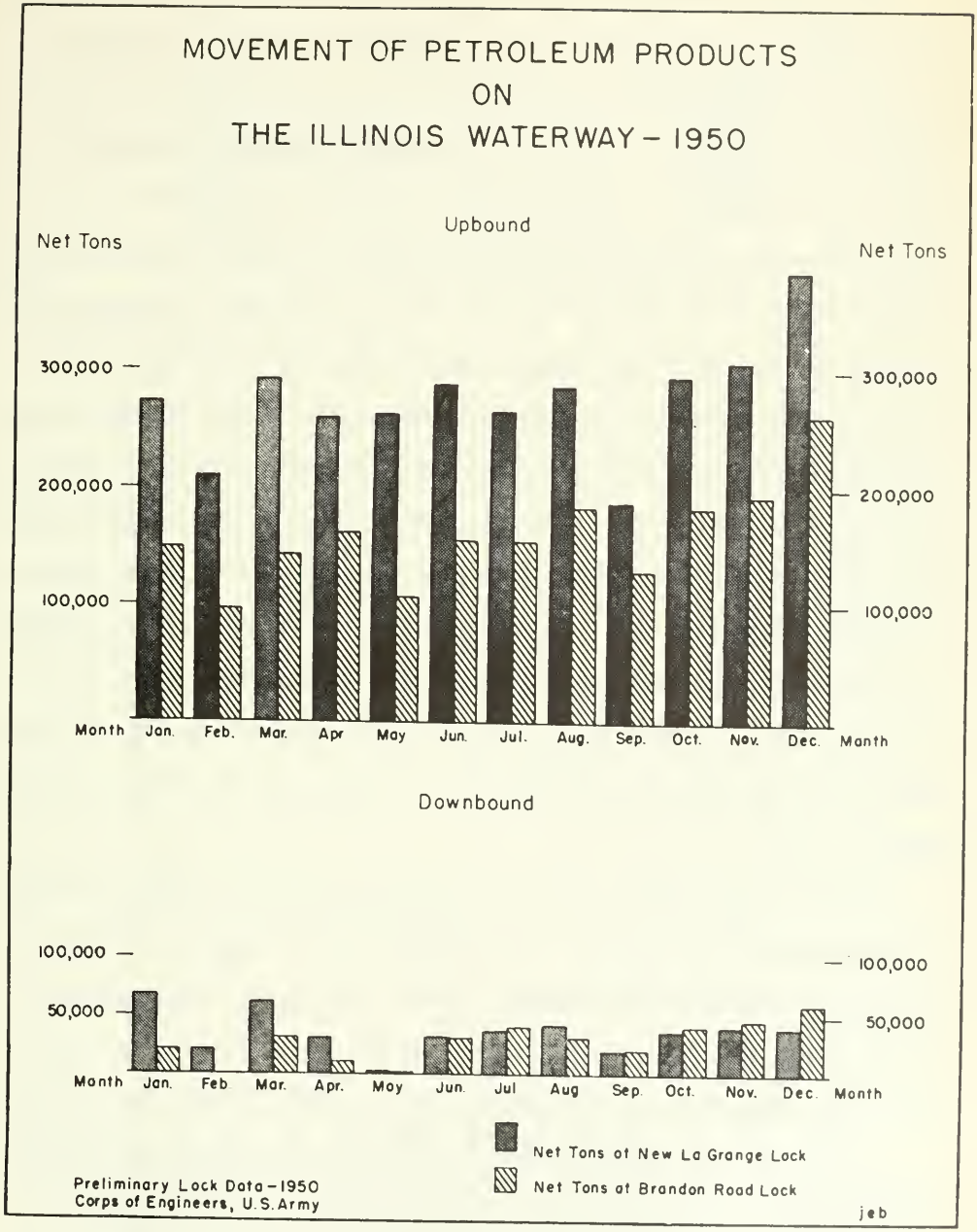

MOVEMENT OF PETROLEUM PRODUCTS
ON
THE ILLINOIS WATERWAY – 1950
Upbound
Net Tons
Net Tons
300,000
200,000
100,000
Month
Jan.
Feb.
Mar.
Apr
May
Jun.
Jul.
Aug.
Sep.
Oct.
Nov.
Dec.
Month
Downbound
100,000
50,000
Month
Jan.
Feb
Mar.
Apr.
Moy
Jun.
Jul
Aug
Sep.
Oct.
Nov.
Dec.
Month
Net Tons at New La Grange Lock
Net Tons at Brandon Road Lock
Preliminary Lock Data – 1950
Corps of Engineers, U.S. Army
jeb

Fig. 50

The volume of petroleum traffic is fairly uniform throughout the year, but the amount of each kind of product varies seasonally. Receipts at Chicago, as indicated by upbound traffic through Brandon Road lock (fig. 50),[1] show summer traffic as uniformly high; in 1950 this was composed primarily of gasoline.[2] Slight traffic drops in the late spring and early fall of 1950 resulted from deliberate reductions in stocks. This was done in order to change reservoirs from fuel and heating oils to gasoline in the late spring and the reverse procedure in early fall (fig. 50). The February drop as indicated in figure 50 is due to the closing of the Lockport lock for repairs but because pipe lines were used--connecting barges on either side of the lock--traffic was not completely halted as was the case for coal and sand.[3] December shipments were much higher due to efforts to build up adequate stockpiles of gasoline in anticipation of the winter closing of Brandon Road lock for six weeks beginning January 15, 1951. Summer is a period for stock piling although gasoline does make up a preponderance of water movements. Summer is also the peak period of its consumption, and during these months limited reserves of fuel oil, heating oil and kerosene are gradually built up.[4]

Barges are not used in a uniform manner for petroleum products. Rather they take up slack in pipe lines. This is despite the fact that costs of delivery by barge are less on a per-mile basis. Pipeline tariffs are lower than barge due to the more direct route. Another advantage is that less administrative work is required and a more regular delivery is possible. In 1946 estimates of

---

[1]1950 data were selected because of the very rapid increase in petroleum product traffic in recent years; an average would give an erroneous picture of current traffic.

[2]Department of Interior Summaries, op.cit.

[3]See previous sections of this chapter pertaining to coal and sand.

[4]Meyer, op.cit.

the comparative operating costs of moving petroleum products were:

Kind of carrier	Cost per ton-mile[1]
Truck	$ .06125[a]
Railroad	.01695[a]
Pipe line (gasoline)	.00445[a]
Pipe line (crude)	.00344[a]
Barge	.00125[b]
Tanker	.00082[a]

Since 1946 increases in costs and rates have been percentage-wise so that today the spread is even greater.

It is difficult, if not impossible, to set up a direct comparison between cost of shipment by barge, as compared to rail and pipe line, the chief reason being that origins and destinations are not the same. Moreover, as previously pointed out, combinations of transportation agencies are used to effect ultimate delivery. The one basic fundamental concept involved in the question of barge or pipe line versus rail is the matter of the first two modes delivering volumes entirely beyond the capacity of the railroads in any reasonable period of time. An average small barge holds 10,000 barrels, or 420,000 gallons. Such a barge is equivalent to 42 tank cars. An average tow on the Illinois River consists of eight such barges, or the equivalent of 336 tank cars or six trains of 56 cars each. Although river transportation is considered slow, it is much faster than rail when such volumes are concerned. The additional paper work alone involved in such rail movements would be costly, not to mention construction of rail sidings and marshalling yards. Therefore, it is not surprising that only 3 per cent of the crude[2] and less than 10 per cent of all petroleum products reach Chicago by rail. Ratewise, the struggle exists only between barge and pipe line.

[1a] Report of the President's Advisory Committee on the Merchant Marine, Washington, D.C., November 1947, p.42.

[b] Letter from S. T. Foote, National Oil Transport Corp., November 29, 1950.

[2] Department of Commerce, Industry Report, op.cit., p.25.

A satisfactory comparison is made more complex by the fact barge rates are subject to fluctuations. The transportation of petroleum products and other bulk commodities are specifically exempted from regulation by the Interstate Commerce Commission. Consequently, carriers, other than common, do not make public their tariff schedules. River transportation is performed on a charter basis and the rate for any particular contract varies depending upon the demand at the time. The commercial rate on petroleum for long-haul movements to Chicago from the Gulf or lower Mississippi, has ranged from 2 3/4 mills to 3 3/4 mills per ton mile.[1] In December 1950 barge rates were 3 1/4 mills per ton mile for the longer hauls[2] and 3 1/2 mills for the shorter hauls.[3] Low cost back-hauls, downbound from Chicago, result due to charter prerogative[4] and make possible much southbound traffic petroleum.

Pipe lines currently have certain rate advantages over barge. As pointed out, the per-mile costs by barge were less than pipe line in 1946. However, the more direct route followed by the latter usually results in a more favorable total charge, but this is not always true (fig. 51). Increasing this difference in mileage is the use of the 1942 Coast Guard Light list, which gives river distances before cut-offs were made on the lower Mississippi. Furthermore, where a large volume is required in a uniform flow, as by a large refinery, pipe line offers an advantage.

---

[1]Foote, op.cit.

[2]Long hauls as far as Chicago is concerned would be from Helena, Arkansas or origins south. Short hauls originate at East St. Louis and Wood River, Illinois.

[3]Fyfe, op.cit.

[4]Separate towing contracts are usually made for each shipment of petroleum and rates are set according to current demand. Therefore, as the petroleum traffic is moving primarily into Chicago, considerable empty tank barge volume must necessarily return--southbound. This frequently results in exceptionally low charter rates for downstream petroleum movements.

Markets

There are eleven refineries in the area this study considers Greater Chicago, five in Illinois and six in Indiana. Only three are on river or canal but the six in Indiana do have access to barge transport via Lake Michigan. The three refineries on the waterways within Chicago have a crude oil capacity of 97,000 barrels daily (fig. 52).[1] As noted, barge shipments of crude oil are exceedingly small so the main use these refineries make of canal transport is to supplement supplies and for distribution.

EXAMPLES OF BARGE AND PIPE LINE RATES
PER NET TON OF CRUDE OIL

From	Crude Oil[a] To	Barge	Pipe Line
Corpus Christi, Texas	East Chicago	$6.73[b]	$3.09[c]
Hufsmith, Texas (Houston)	East Chicago	6.20[a]	2.96[d]
	Petroleum Products To		
East St. Louis	East Chicago	1.26[e]	1.92[f]

[a]6.567 barrels of crude oil to a ton, converted at the rate of 7.25 lbs. per gal., 42 gals. per barrel.

[b]3.25 mills per mile.

[c]Sinclair Pipe Line Company Tariff of 42 cents per barrel plus a five cents collecting charge.

[d]Service Pipe Line Company Tariff of 37 cents per barrel plus five cents per barrel gathering charge.

[e]3.5 mills per mile.

[f]Phillips Pipe Line Company Tariff of 25 cents per barrel.

Fig. 51

Terminals are primarily distributing points (fig. 53). Above Brandon Road Lock there are 18 terminals. They, together with the three refineries have a

[1]R. B. Tuttle, "U.S. Refineries Have Crude-Oil Input Capacity of 6.75 Million Barrels", Oil and Gas Journal, March 23, 1950, p.309.

Fig. 52--The Texas Company Refinery at Lockport, Illinois. The Sanitary and Ship Canal on the left. Immediately below the horizon is the Globe Oil Refinery at Lemont, Illinois. (Material Service stockpiles line the west bank of the canal--left center. -- Courtesy Chicago Aerial Survey.

storage capacity in excess of 11,000,000 barrels,[1] and construction of additional tanks is in progress. Dependent on the barge for supplies, the terminals distribute by truck and rail. Trucks handle most of the outbound volume but tank cars are used--especially for more distant points--within the zone of distribution (fig. 54).

The zone of distribution extends north along the western shores of Lake Michigan (fig. 54). The area blanketed by Chicago distribution channels extends as far north as Appleton, Wisconsin, and toward the northwest it includes Madison, Wisconsin. The boundary cuts sharply to the southeast from Madison barely

[1]Butcher-Arthur, Inc., Train Speed at Water Rates, Houston, Texas, 1950, p.12.

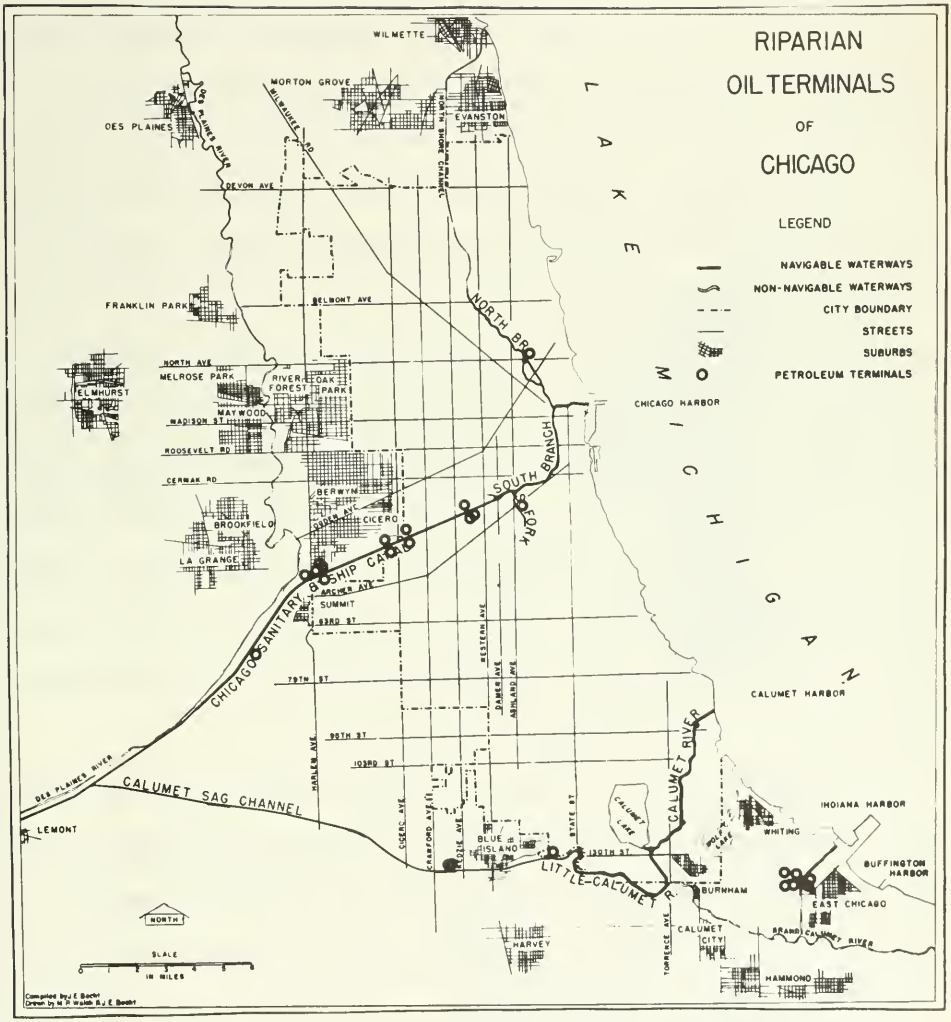

RIPARIAN
OIL TERMINALS
OF
CHICAGO
LEGEND
NAVIGABLE WATERWAYS
NON-NAVIGABLE WATERWAYS
CITY BOUNDARY
STREETS
SUBURBS
PETROLEUM TERMINALS
LAKE MICHIGAN
WILMETTE
MORTON GROVE
EVANSTON
DES PLAINES
DES PLAINES RIVER
DEVON AVE
FRANKLIN PARK
BELMONT AVE
NORTH BR
NORTH AVE
MELROSE PARK
RIVER FOREST
OAK PARK
ELMHURST
MAYWOOD
MADISON ST
ROOSEVELT RD
CERMAK RD
BERWYN
CICERO
BROOKFIELD
LA GRANGE
SOUTH BRANCH
CHICAGO HARBOR
CHICAGO SANITARY & SHIP CANAL
ARCHER AVE
SUMMIT
63RD ST
79TH ST
WESTERN AVE
DAMEN AVE
ASHLAND AVE
CALUMET HARBOR
99TH ST
103RD ST
HARLEM AVE
CALUMET SAG CHANNEL
LEMONT
CICERO AVE
CRAWFORD AVE
KEDZIE AVE
BLUE ISLAND
STATE ST
CALUMET LAKE
CALUMET RIVER
INDIANA HARBOR
WHITING
HOLMAN LAKE
BUFFINGTON HARBOR
EAST CHICAGO
131ST ST
LITTLE CALUMET R.
BURNHAM
CALUMET CITY
TORRENCE AVE
HARVEY
HAMMOND
GRAND CALUMET RIVER
NORTH
SCALE
IN MILES

Fig. 53

including De Kalb, Aurora, Joliet and Morris, Illinois.[1] Barge petroleum products do not reach into northwestern Indiana due to competition from the large refineries at Whiting, Gary and East Chicago. The Rockford pipe line, supplied by barge at Peru, Illinois, reaches as far north as Janesville, Wisconsin. Rates from Mississippi River terminals restrict the western margin of the zone.[2] Iron Mountain and Escanaba, Michigan are examples of points to which rail deliveries are occasionally made beyond the blanketed distribution zone (fig. 54).[3] What effect the trans-Canadian pipe line, terminating at Duluth, will have on this market area of barged petroleum products is problematical. Eventually it will probably capture marginal markets about the fringe. The demarcation line is not sharp, and shipments, especially by tank car, reach beyond the confines of the delimited area. Some products, especially fuel oil, are transhipped from the river-canal terminals by lake tankers. These products move to such lake ports as Bay City and Traverse City, Michigan. These transactions are often completed by trading materials at refineries or terminals along the waterway in exchange for petroleum products, such as gasoline and fuel oil, at the lake front, especially from Indiana Harbor, Indiana.[4]

The largest cluster of riparian petroleum terminals is at Harlem Avenue and the Canal (fig. 53). Here are located five terminals with a combined capacity of 1,662,000 barrels (fig. 55). This point has excellent rail connections traversed by two trunk lines[5] and is situated between two belt lines.[6] It is also

---

[1]Meyer, op.cit., and Lierboe, op.cit.

[2]The major portion of this trade is based on selling on group three basis and the difference between that and rail, or truck, rates is the margin of profit delimiting the distribution zone of barged petroleum products.

[3]Statement by Paul E. Lierboe, Waterways Terminals, Inc., personal interview.

[4]Meyer, op.cit.

[5]Gulf Mobile and Ohio and the Atchison, Topeka and Santa Fe Railroads.

[6]Indiana Harbor Belt Line and The Belt Railroad of Chicago.


DISTRIBUTION ZONE
OF
PETROLEUM PRODUCTS
BARGED INTO CHICAGO
LEGEND
Distribution Zone
City Under 500,000
City 500,000 and Over
State Boundary
Lake Superior
MINNESOTA
MICH.
WISCONSIN
IOWA
ILLINOIS
INDIANA
Duluth
St. Croix R.
St. Paul
Iron Mountain
Escanaba
Green Bay
Appleton
Manitowoc
La Crosse
Fond du Lac
Madison
Milwaukee
Lake Michigan
Beloit
Kenosha
Rockford
Waukegan
De Kalb
CHICAGO
Aurora
Whiting
East Chicago
Gary
Joliet
Morris
Peru
Peoria
Mississippi R.
Illinois Waterway
Wood River
ST. LOUIS
East St. Louis
Wabash R.
Ohio R.
N
Scale
0 10 20 30 40 50
In Miles
Compiled and Drawn by J.E. Becht

Fig. 54

a compromise location allowing trucks to reach Chicago readily as well as skirt the western fringe of the city enroute to customers in eastern Wisconsin. In general, riparian terminals located east of Cicero Avenue concentrate on Chicago customers, those to the west deliver to both city and out-of-city customers.

Petroleum products of all kinds are handled in bulk form as a bank handles currency. Accounts are kept for regular users, ranging from one customer to as many as eight or nine.[1] Also, cash sales are made to individual buyers. Sometimes products in storage are exchanged for materials in tanks at such points as Rockford and St. Paul, as well as lake front terminals. They are also traded for products of inland refineries.[2] Thus, barges provide a high degree of flexibility that is available to jobbers and small operators who cannot readily use pipe lines. The variety of products carried by water adds to the ability of the industry to adjust to demands. Although pipe lines can move great varieties of products, it does not always prove profitable to charge lines with relatively small volumes of highly volatile materials subjected to great pressures for transport purposes; barge is, at present, the more satisfactory way of shipping these commodities.[3]

Potential

In summary, it appears that petroleum traffic, though still increasing, will level off at a figure of less than 5,000,000 net tons annually. The advantages of pipe line for volume deliveries, for regularity and rate are such that, by and large, their construction will be designed to keep them in continuous operation. For peak periods, for jobbers, for small operators, and for small markets

---

[1]Statement by Abraham Feldman, Lake River Oil Co., personal interview.
[2]Lierboe, op.cit.
[3]Statement by A. L. Malone, Economic Division, Board of Engineers for Rivers and Harbors, Washington, D.C., personal interview.

Fig. 55--Petroleum Terminals at Harlem Avenue and The Sanitary and Ship Canal. Harlem Avenue bridge in the foreground. Harlem Avenue Barge Terminals, Inc. lower left. Lake River Oil Co. immediately across Harlem Avenue with Arrow Petroleum Co. to the north and to the east of it. In the upper center The Pure Oil Co. and on the south bank, upper right of the photograph, the Waterways Terminals, Inc. Note new tank construction lower left.--Courtesy Chicago Aerial Survey Co.

barges can be used to advantage. Great increases in heating and fuel oil consumption--which appears a certainty--will probably result only in temporary increments in barge traffic. Thus, petroleum cargoes on the waterway, unlike the commodities of coal and sand, seem destined to be limited by another transport medium, the pipe line.

D. GRAIN

Introduction

Traversing one of the world's most productive large agricultural areas and having access to outstanding grain terminals in Chicago, New Orleans, and St. Louis, as well as many smaller grain market centers, the Illinois Waterway has become an important carrier of grain. As grain is bulky and adaptable to automatic loading and unloading facilities, it lends it self readily to barge transportation. Furthermore, as the method of marketing grain results in it being stored for considerable periods, the added time in transit is an advantage rather than a disadvantage because, in effect, it is being stored and transported simultaneously. These are the main geonomic principles which have caused grain to rank fourth in tonnage currently on the Illinois Waterway.

Until recent years grain transportation on the Illinois Waterway has been of minor significance. The Turner Hudnut Grain Company of Pekin, Illinois, maintained grain movements by barge following the decline of river transportation toward the end of the nineteenth century.[1] Small grain elevators located on the banks of the Illinois within sixty miles of Pekin collected grain to be barged into the central elevator at that river port (fig. 56). All grain was railed out of Pekin until 1933-34 when J. O. McClintock of the Chicago Board of Trade urged and obtained experimental barge shipments to both New Orleans and Chicago. In the late thirties Havana was used as a collecting point for grain to be shipped to the West Coast--via barges to New Orleans and thence by coastwise vessels through the Panama Canal. This movement was handled initially

[1]Statement by J. O. McClintock, Chicago Board of Trade, personal interview.

Fig. 56--Abandoned grain elevator formerly used in collecting grain for delivery to Pekin and rail beyond. Several of these are to be found dotting the river banks between Beardstown and Peoria.

by the Farmers' Grain Company then, in turn, by the National Grain Company and the Continental Grain Company. Also, the Continental Grain Company successfully applied the Lake Grain proportional[1] on eastbound grain through Chicago and other companies were quick to follow. Instead, then, of there being only three or four grain elevators along the entire Illinois Waterway, there came to be as many as that at each of several points (fig. 57)[2]

[1]Grain was sold in markets of eastern United States and overseas on the basis of barge-lake rates, or rail-lake rates rather than on all-rail rates to the east cost. That grain shipped by lake was destined for delivery at lower lake ports or for movement down the St. Lawrence River or New York Barge Canal.

[2]McClintock, op.cit.


GRAIN ELEVATORS
ALONG
THE ILLINOIS WATERWAY
IOWA
RIVER
CHICAGO
LAKE MICHIGAN
WATERWAY
LOCKPORT
JOLIET
MORRIS
SPRING VALLEY
HENNEPIN
LA SALLE
OTTAWA
SENECA
HENRY
LACON
CHILLICOTHE
INDIANA
ILLINOIS
PEKIN
MISSISSIPPI
ILLINOIS
HAVANA
NORTH
MEREDOSIA
NAPLES
MONTEZUMA
MISSOURI
MISSOURI
RIVER
ST LOUIS
LEGEND
RIVERS AND CANALS
STATE BOUNDARY
CITIES UNDER 500,000
CITIES 500,000 AND OVER
GRAIN ELEVATORS
SCALE
0 10 20 30
IN MILES
Compiled and Drawn by J E Becht
March 1951

Fig. 57

Traffic in barged grain to Chicago has developed during the last eighteen years. The Chicago Board of Trade reported receipts by waterway for the first time in 1933 with a total of 137,000 bushels of wheat and corn. Annual reports of the Board of Trade indicate a steady growth until 1940 when almost twenty million bushels of grain were unloaded from barge into Chicago terminals. During the early years of World War II shipments declined. In 1944, however, there began a development that resulted in more than 28 per cent of all the grain delivered to Chicago in 1950 arriving via the Illinois Waterway (fig. 58).[1] In that year more than 38 per cent of all corn moved into Chicago came by barge.[2]

Recent Growth of River Grain Traffic

This large growth of river grain traffic into Chicago in recent years is the result of several distinct factors. They are 1) the Illinois Waterway traverses one of the world's most productive large agricultural areas; and 2) the waterway has access to large grain markets; 3) the area within which combined truck and barge transportation costs are less than rail rates has been increased by recent percentage-wise rate increases; 4) grain moving into Chicago by other mediums than rail are, as of 1947, no longer penalized by higher rail rates to the eastern markets; 5) there is an ever-increasing awareness on the part of farmers and inland elevators of the advantages of shipping by barge; 6) volume handled by river houses is such as to enable them to provide government inspectors; 7) there have been recent and current improvements of facilities for shipping by water; and 8) an ever-increasing awareness on the part of truckers from non-industrial, non-fruit, and non-truck farming areas that grain, in paying volume, can be handled at several points convenient to them on the Illinois waterway.

---

[1] Annual Reports of The Chicago Board of Trade, Statistics Department.
[2] Ibid.

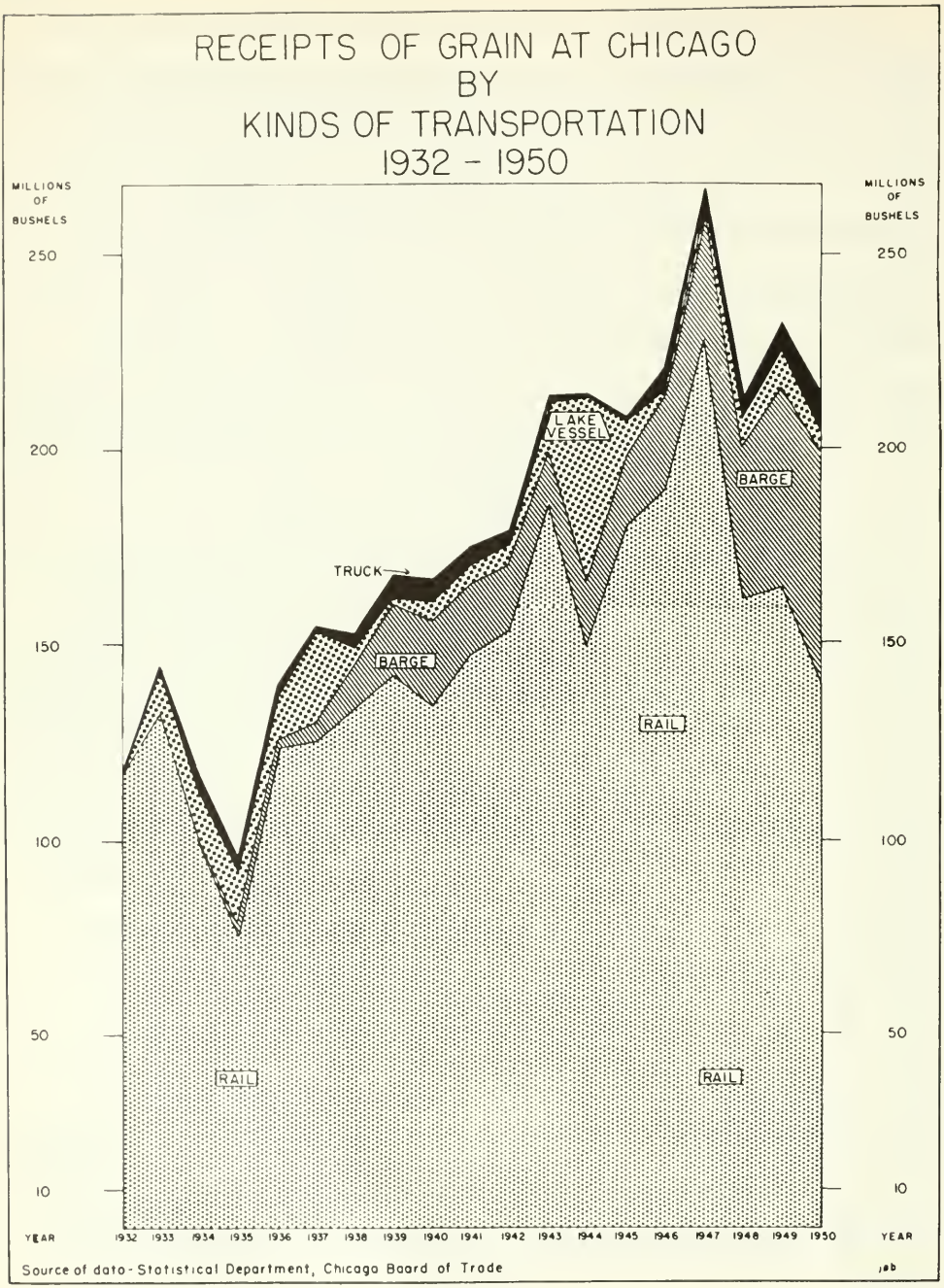

RECEIPTS OF GRAIN AT CHICAGO
BY
KINDS OF TRANSPORTATION
1932 - 1950
MILLIONS OF BUSHELS
250
200
150
100
50
10
YEAR
1932 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950
TRUCK
LAKE VESSEL
BARGE
RAIL
BARGE
RAIL
RAIL
Source of data - Statistical Department, Chicago Board of Trade

Fig. 58

Origins

The first of these eight factors is the result of an advantageous climate, a fertile soil and a level topography adapted to the use of power machinery. These elements have joined forces to bring about a highly productive agriculture in Illinois and its neighboring states. The favorable position occupied by the Illinois Waterway becomes evident when it is superimposed on this rich agricultural region as materialized on a map (fig. 59).

The four grains that lend themselves most advantageously to water transportation are corn, wheat, soybeans, and oats. Figure 59 shows combined yields per acre of these four crops in 1948, a year of peak production, for the total area by counties in Illinois, Indiana, Wisconsin, Iowa, Minnesota and Missouri. Two main centers of high yield are apparent, one in Iowa, the other in Illinois.

The second of eight factors is that the waterway provides access to large markets. The advantages accruing to the Illinois Waterway by virtue of its pivotal position in the eastern high-yield core is strengthened by the fact that the waterway terminates at two great marketing points, Chicago, the world's largest, and via the Mississippi River, New Orleans, an important export shipping point. In addition the waterway passes through two other important grain hubs, St. Louis and Peoria. Also, it provides access through tributary Cumberland and Tennessee Rivers, to such distributing and processing points for southeastern United States as Nashville, Tennessee and Guntersville, Alabama. In fact, one large firm is shipping grain into Florida by transhipping from barge to truck at Guntersville, Alabama for movement beyond.[2] Chicago is by far the largest of these grain markets, its receipts fluctuating between three and four

[1]Annual Report Chicago Board of Trade, Statistics Department.
[2]Letter from L. L. Crosby, Cargill Inc., December 6, 1950.

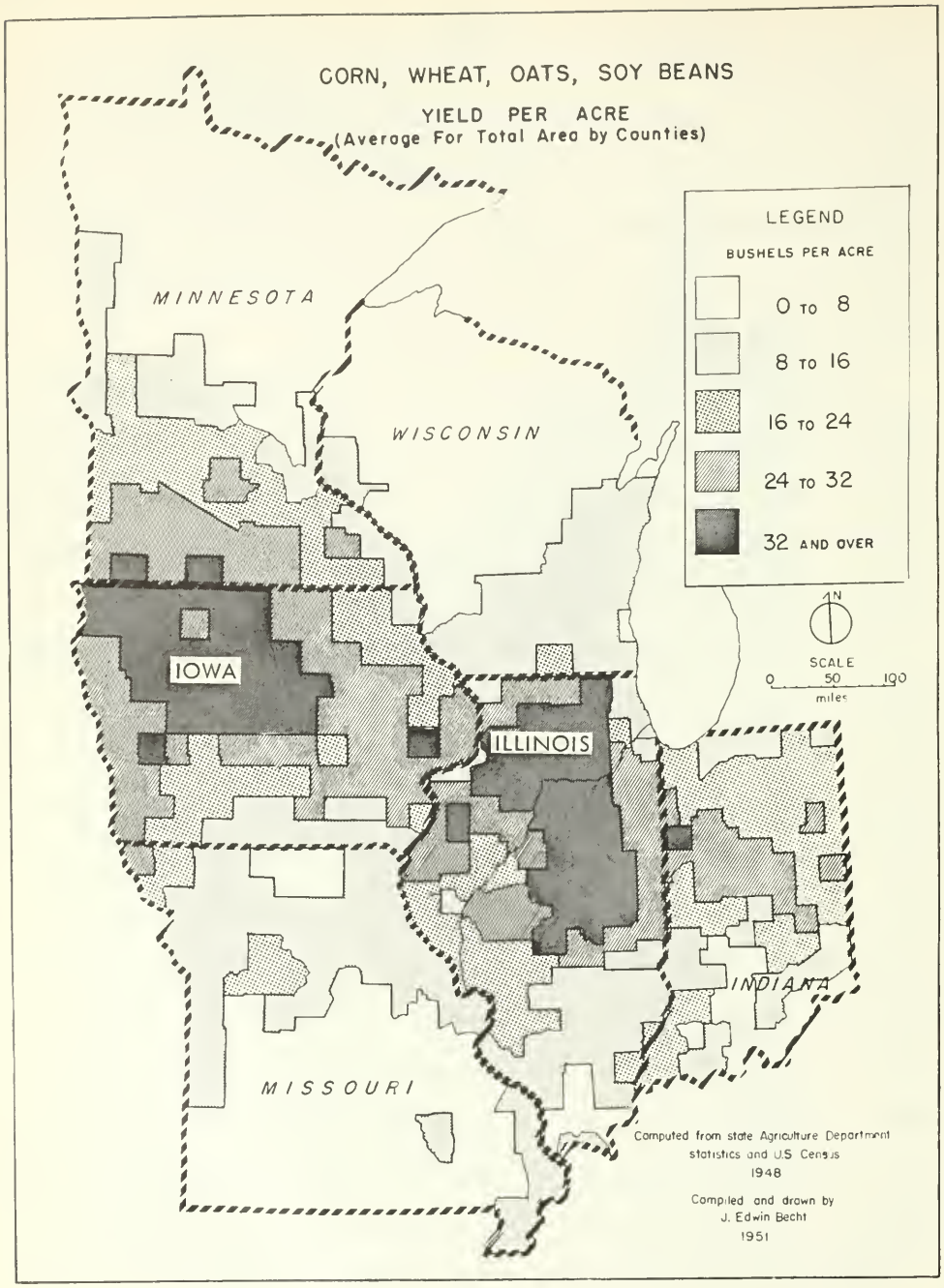

CORN, WHEAT, OATS, SOY BEANS
YIELD PER ACRE
(Average For Total Area by Counties)
LEGEND
BUSHELS PER ACRE
0 TO 8
8 TO 16
16 TO 24
24 TO 32
32 AND OVER
N
SCALE
0 50 100
miles
MINNESOTA
WISCONSIN
IOWA
ILLINOIS
INDIANA
MISSOURI
Computed from state Agriculture Department statistics and U.S Census
1948
Compiled and drawn by
J. Edwin Becht
1951

Fig. 59

times those of St. Louis, one of its nearest competitors.[1]

The third factor stimulating barge traffic in grain following World War II is the rate increases allowed railroads. For example, figure 60 shows the area within which the barge-truck rates are less than the rail rate to Chicago.[2] Each time rail rates are increased and these increases are not equaled percentage-wise by both truck and barge rates, then the line connecting points at which barge-truck rates equal rail rates will move further from the waterway. The radius of a circle about a riparian elevator within which it enjoys a barge-truck rate advantage over rail increases approximately five miles for each one cent per hundred pounds difference between barge-truck and rail rates.[3] Therefore, the chief effects of rail increases percentage-wise, as well as absolute, is in the total area from which river houses enjoy rate advantages. These advantages are intensified by the fact that the supply area increases according to the square of its radius which, in turn, increases in direct proportion to increases in the difference between barge and rail rates.[4]

---

[1]Annual Reports, Chicago Board of Trade and St. Louis Board of Trade.

[2]Figure 60 shows barge and rail rates on a hundred pounds of grain as they were in 1950. The available rail rates for each county seat were plotted and the five cent isophors plotted by interpolation. The line at which barge-truck rates equal rail rates was approximated by connecting points located a distance of five miles from the waterway for every one cent difference between barge and rail rates; i.e., if the barge rate is four cents at a certain station then the line at which barge-truck rates cross the 20-cent rail isophor should be approximately a distance of (20-4)5 or a total distance of 80 miles. In this regard it should be emphasized that isophors do not show exact rates, but rather rate patterns.

[3]According to Roy D. Erickson, Transportation Department, Chicago Board of Trade, the average cost of trucking grain is one cent per hundred pounds for each five miles, personal interview.

[4]This can be illustrated by citing the following example. In February of 1949 the rates on 100 pounds of grain from Urbana to Chicago was 18.6 cents. In October of 1950 the corresponding rate was 19.5 cents, a difference of 9 mills or an amount sufficient to broaden the truck-barge advantage area four and one-half miles toward the south. In February of 1949 the barge rate from Morris to Chicago was 3-1/4 cents per hundred pounds. This meant that trucks had a 15.35

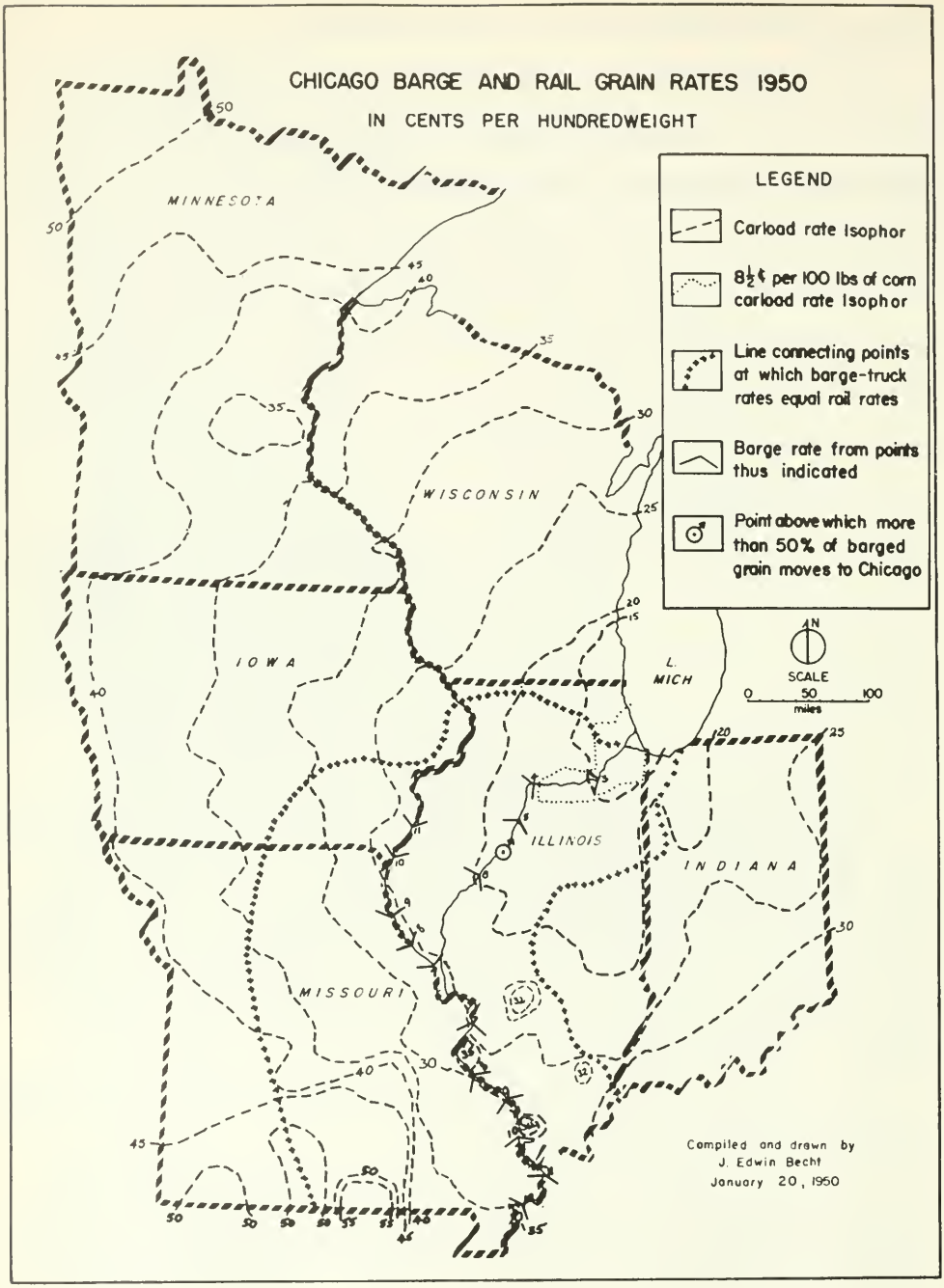

CHICAGO BARGE AND RAIL GRAIN RATES 1950
IN CENTS PER HUNDREDWEIGHT
LEGEND
Carload rate Isophor
8½¢ per 100 lbs of corn carload rate Isophor
Line connecting points at which barge-truck rates equal rail rates
Barge rate from points thus indicated
Point above which more than 50% of barged grain moves to Chicago
MINNESOTA
WISCONSIN
IOWA
L. MICH
ILLINOIS
INDIANA
MISSOURI
N
SCALE
0 50 100
miles
Compiled and drawn by
J. Edwin Becht
January 20, 1950

Fig. 60

The fourth factor resulting in a much larger grain traffic on the Illinois Waterway was the outcome of the Mechling Supreme Court case in 1947. When grain first began to move to Chicago on the Illinois Waterway the Illinois proportional[1] rate was applied on grain shipped to New York and other eastern ports.[2] On all other shipments of ex-barge grain the Northwest proportionals[3] were applied.[4] This, of course, made barge grain more valuable for shipping from Chicago than grain brought in by either rail or truck, due to the higher rates on the latter. This advantage enjoyed by barge was opposed by certain railroads who presented their case to the Interstate Commerce Commission in 1938. Though never enforced, the Commission ruled in favor of the complaining rail carriers on the basis that it would destroy the whole grain rate structure based on proportionals. Litigations followed through the various courts terminating in the 1947 Supreme Court ruling in favor of water carriers and allied interests. The Supreme Court decision was based upon the premise it would cost eastern rail carriers no more to carry ex-barge grain than it would to carry grain that had arrived in Chicago by rail.[5]

---

cents difference in February of 1949 with which they could theoretically reach 76.75 miles toward Urbana. By October of 1950 this difference had been increased to 16.25 cents or 81.25 miles, a difference sufficient to result in Urbana being located on the fringe of the barge-truck advantage zone. In this case a rail increase of 9 mills on 100 pounds of grain resulted in more than 125 square miles of Champaign County--cash grain farming with an average yield from every acre in excess of 32 bushels--being included in the truck-barge advantage area. This would mean a minimum increase in potential barge traffic of 2,560,000 bushels from this one county alone.

[1]The proportional rate can be illustrated by referring to the existing rates from Urbana, Illinois to Chicago and New York. The Illinois proportional rate from Urbana to Chicago was 19.5 cents per 100 pounds, October 1950, and the New York rate was 61.5 cents. Grain could be railed to Chicago, stored there and then shipped to New York at a uniform rate of 42 cents a hundred pounds under the New York rate.

[2]McClintock, op.cit.

[3]In effect the results are the same as with the Illinois proportional rates.

[4]McClintock, op.cit.

[5]Statement by F. A. Mechling, A. L. Mechling Barge Lines, Inc., personal interview.

In view of the volume of grain shipped from Chicago by lake and rail the advantage of applying proportionals to ex-barge grain is of great importance to rail and to water interests alike. In each of the last six years one-half or more of all grain receipts in Chicago has been shipped (fig. 61).

MOVEMENT OF GRAIN AT CHICAGO[a]

Year	Receipts In Bushels	Shipments In Bushels	Per Cent of Receipts Shipped
1945	206,953,000	130,502,000	63
1946	217,266,000	138,058,000	64
1947	266,313,000	158,202,000	59
1948	215,086,000	107,380,000	52
1949	232,955,000	131,804,000	57
1950	211,955,000	105,581,000	50

[a]Source of data: Statistical Department, Chicago Board of Trade.

Fig. 61

The fifth of the eight outstanding factors that has resulted in recent increments in barge shipment of grain is an ever-increasing awareness on the part of farmers and inland elevators of the advantages accruing to waterway users. By loading more than their own storage capacity in a single day the larger river houses must rely on inland elevators to maintain their supplies of grain. Thus, the inland elevators have found that their services as "middle man" between farmers and river houses are required because the latter could not readily contact enough farmers to meet their needs. The older and smaller river houses cater to local farmers rather than draw from inland elevators but not the larger riparian houses. Also, the inland elevators frequently act only as the "middle man" and grain purchased from them, or through them, moves directly from farm to river house.

The sixth factor that has effected increased barge shipments of grain is the advantage made possible by the volume of grain handled at riparian houses. The volume is sufficient to enable river elevators to employ government inspectors. The advantage to the farmer or inland elevator is two-fold. First, early inspections make it possible for farmers or inland elevators to receive payment within twenty-four hours for grain delivered to riparian houses; and second, the farmer or inland elevator is more likely to receive a better price for borderline grades of grain that might deteriorate in transit. If the testing is not made prior to shipment, as is the case with rail shipments, the price is fixed when the grain is inspected upon arrival in Chicago. Frequently grain, especially corn, will absorb moisture and deteriorate in other ways enroute. Therefore, it is to the farmer's, or inland elevator operator's, advantage to have grain inspected prior to its movement.

The seventh factor resulting in an increased use of barge transportation for grain is the recent and current improvement of facilities to handle the trade. Beginning in 1938 various grain companies operating river houses instituted programs to improve facilities.[1] These programs reached a peak in 1949; and improvements and/or enlargements were still in progress in late 1950. These new facilities--constructed for grain traffic on the Illinois Waterway--are of three types. They are: 1) river houses, 2) Chicago terminals and processing plants, and 3) transportation equipment.

The first type of new facilities are river houses. The newer river houses are of special construction and are usually larger than their inland counterparts. Some hold more than 200,000 bushels. River houses, other than the small plants

---

[1]McClintock, op.cit.

built prior to the canalization of the Illinois Waterway are so constructed that their entire storage capacity can be loaded within a twenty-four hour period. If deep water is available, grain can be loaded from a "header bin" into barges through a gravity spout (fig. 62); or, in the case of shallow water or low banks conveyor belts may be required to carry grain out to barges (fig. 63).

Fig. 62--Morris Grain Elevator at Ottawa loading barges by gravity spout from a header bin. This is possible only where deep water is available close to the bank.

Relatively few "old" elevators remain in use--still in use are only those at Hennepin, Henry, Lacon, Chillicothe, Pekin, and Havana (fig. 57). The only sizeable ones are located at Pekin and Havana and these were formerly the collecting elevators for the other points. New elevators have been built at Lockport, Joliet, Morris, Seneca, Ottawa, La Salle, Spring Valley, Hennepin, Lacon, Pekin,

Havana, Beardstown, Naples and Montezuma (fig. 57). Only at Chillicothe, lacking a bridge across the Illinois River, was existing equipment not augmented by new facilities. The river houses are operated by four Chicago concerns, one cooperative association made up of inland elevators, and several locally-owned companies.

Fig. 63--Cargill Elevator at Havana. Belt extending out to deep water conveys grain to barges.

An example of the new elevators is the Morris house of the Continental Grain Company of Chicago. It has a capacity of 110,000 bushels and can handle more than 70,000 bushels in a single day by means of an enclosed 36-inch wide conveyor belt extending out into the river. Supported on a trestle, this conveyor pours grain into barges at a rate of almost 15,000 bushels per hour.[1] William

[1]McClintock, op.cit.

Webb of the Des Plaines Valley Cooperative Association's elevator at Joliet, with average equipment, asserts that under ideal conditions a barge, holding the equivalent of 18 box cars, can be loaded at that elevator in two and one-half to three hours, and that four hours is the maximum time needed.[1] Clusters of pilings, visible in figures 62 and 63, are provided for "tieing off" barges. Some of the newer houses, in order to secure strategic locations, are constructed with "bulk-heads" that can be sealed for protection against flooding.

A satisfactory road net is requisite for the receipt of grain at riparian elevators in sufficient volume for barge operations. The use of semi-trailer trucks requires roads able to support the weight of heavy vehicles. In addition to good roads the use of semi-trailer trucks means that special facilities need also be constructed to weigh and unload them rapidly. Individual grain dealers desire to locate river houses where no competition exists but this apparently is not a requirement for more than one house is operated successfully at each of several points along the waterway (fig. 57). Rather it is much more important to situate riparian elevators near the center of a large producing area with a good road net.

Road nets vary and influence the size and shape of the supply zones of riparian houses. At Morris an excellent north-south highway--Illinois 47--provides rapid avenues of approach (fig. 64). Good roads are in part responsible for the fact that Morris is the world's largest grain collecting center. At Havana access to the city is facilitated by highways that fan out from either end of the bridge (fig. 64) and Havana elevators can draw from a nearly circular area. At Pekin the road net is satisfactory on the east side of the river but to the west

[1]Statement by William Webb, Des Plaines Valley Cooperative Association, personal interview.

NETWORK OF ROADS ABOUT SELECTED RIVER GRAIN ELEVATORS

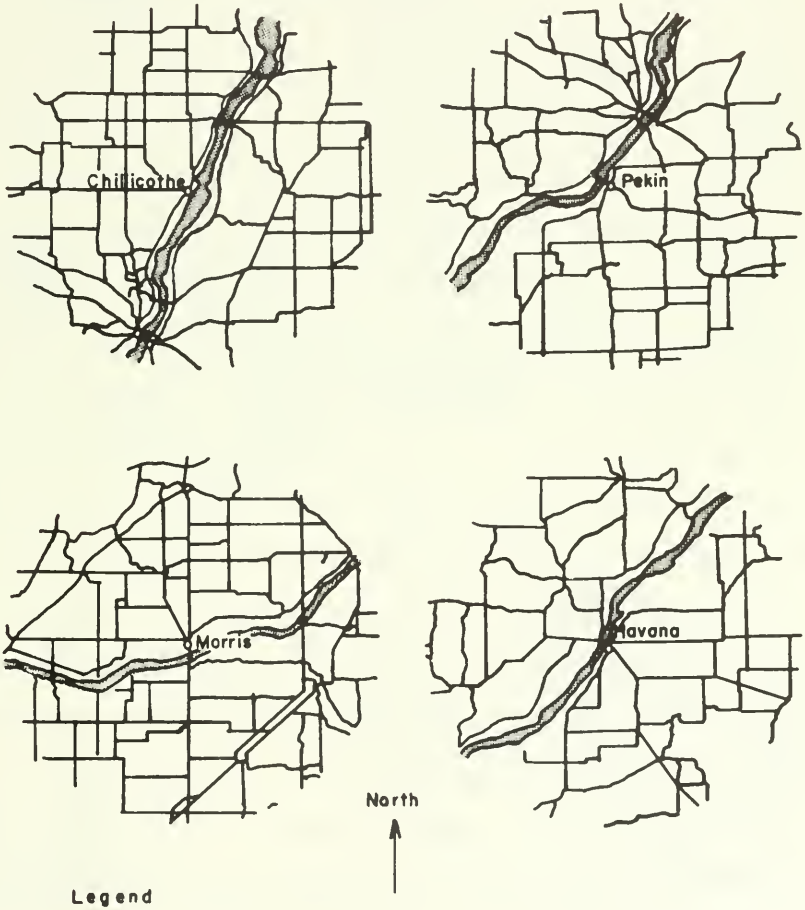


Fig. 64

Drawn April 1950
by J.E.Becht

roads are poor and do not directly reach the grain producing areas west of Peoria. Rather the highways enter Peoria and parallel the river to the south, skirting a large strip mining area of coal. Furthermore, the presence of a large grain market in Peoria entices most grain from the west that might otherwise be barged from Pekin grain elevators. Therefore, grain houses at Pekin draw grain from a near semi-circle, on the river's east bank rather than a full circle as at Morris. As a result Pekin has a relatively limited potential. The lack of a bridge, as at Chillicothe, limits the drawing area of grain elevators even more effectively and results in fewer and smaller houses (fig. 64).

The modernization of existing terminals and the construction of new waterfront elevators and processing plants in Chicago are another form of recent improvements in facilities to handle an increase in grain traffic on the waterway. Once having reached Chicago grain is transhipped at large terminal elevators. Chicago has ten of these elevators, ranging in storage capacity from 550,000 bushels to slightly over 10,000,000 bushels (fig. 65). Continental Grain Company, for example, has built an addition to its Chicago elevator that has increased its capacity to 4,000,000 bushels (fig. 66) and provides a second "marine leg" to unload barges. Marine legs unload a barge of 27,000 to 30,000 bushels in slightly less than four hours.[1] Illinois Grain Terminals, Incorporated plans for barges to be unloaded at its Irondale elevator at the rate of 100,000 bushels every 12 hours, and in a similar period for 400,000 bushels to be placed aboard a lake vessel.[2] All of the waterfront grain terminals have access to lake vessel, barge, rail and truck facilities.

---

[1]Statement by William G. Williams, Continental Grain Co., personal interview.

[2]Statement by O. D. Bresenden, Illinois Terminal Grain Co., personal interview.

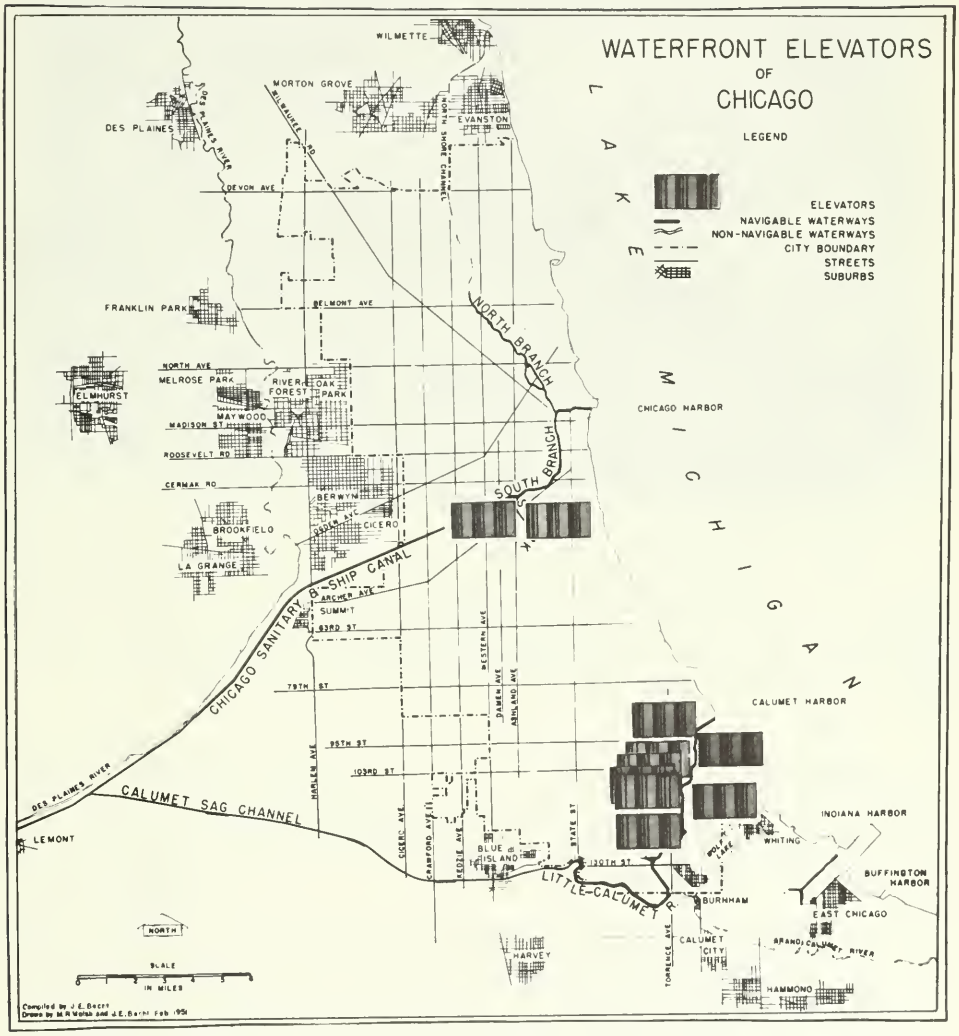

WATERFRONT ELEVATORS
OF
CHICAGO
LEGEND
ELEVATORS
NAVIGABLE WATERWAYS
NON-NAVIGABLE WATERWAYS
CITY BOUNDARY
STREETS
SUBURBS
LAKE MICHIGAN
WILMETTE
MORTON GROVE
EVANSTON
DES PLAINES
DES PLAINES RIVER
MILWAUKEE RD
NORTH SHORE CHANNEL
DEVON AVE
FRANKLIN PARK
BELMONT AVE
NORTH BRANCH
NORTH AVE
MELROSE PARK
RIVER FOREST
OAK PARK
ELMHURST
MAYWOOD
MADISON ST
ROOSEVELT RD
CERMAK RD
BERWYN
CICERO
SOUTH BRANCH
CHICAGO HARBOR
BROOKFIELD
LA GRANGE
CHICAGO SANITARY & SHIP CANAL
ARCHER AVE
SUMMIT
63RD ST
79TH ST
95TH ST
103RD ST
CALUMET HARBOR
CALUMET SAG CHANNEL
LEMONT
HARLEM AVE
CICERO AVE
CRAWFORD AVE
KEDZIE AVE
BLUE ISLAND
HARVEY
STATE ST
130TH ST
LITTLE CALUMET R.
WHITING
INDIANA HARBOR
BUFFINGTON HARBOR
EAST CHICAGO
BURNHAM
CALUMET CITY
HAMMOND
NORTH
SCALE
IN MILES

Fig. 65

Fig. 66--Looking east-southeast toward Continental Grain Company's new barge, lake, rail elevator on the Calumet River. Note their older elevators, to the right, of wooden construction in contrast to the cement type construction of the new house. The Basin shown is Turning Basin No. 1, South Chicago Coal and Dock is on the right, or south, side of the slip, Great Lake Dredge Co. on the left, or north, bank.--Courtesy James E. Metcalf Co., Engineers.

Processing plants are of increasing importance as direct users of barged grain. At their 10,000,000 bushel elevator at 122nd and Torrence Avenue, Cargill, Incorporated has constructed what they claim to be "the world's largest" soybean processing plant (fig. 67). It is planned that slightly over 4,000 tons of soybeans are to be processed weekly, most of which is to be brought in by barge. The transportation advantages of river barge and lake vessel are credited for the selection of this particular site.[1]

---

[1]Statement by Henry Cunningham, Cargo Carriers, Inc., personal interview.

Fig. 67--Cargill Soybean Processing Plant in the foreground, on the west bank of the Calumet River--"World's Largest". (Republic Steel Corporation plant across the river).--Courtesy Cargill, Incorporated.

Character of Traffic

The river carriers have kept pace with the growth of shore facilities by developing towboat operations capable of handling great quantities of grain (fig. 68). The main restriction on the rapid movement of grain to the Calumet area, and hence to eight of the ten Chicago elevators, is the narrow, crooked Sag Channel (fig. 65).

The restrictions on movement imposed by the poor channel of the Sag are important. At the present time grain tows, as well as all other commodities, must be divided for passage through the Sag and no more than three 30,000 bushel barges, or no more than two jumbo barges may proceed in one tow into the Calumet area. The costliness of this restriction is evidenced by the fact

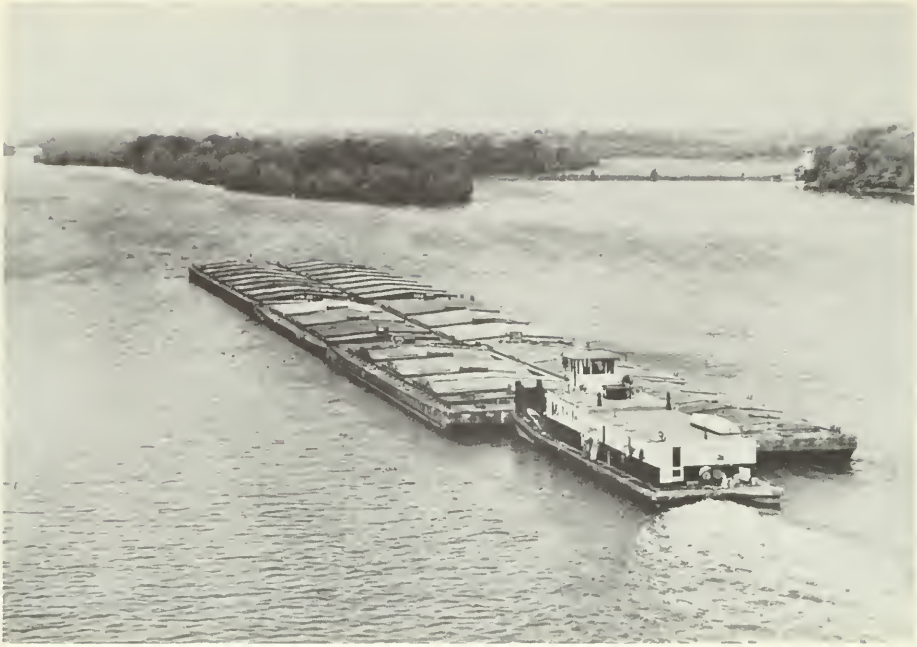


Fig. 68--Grain Tow Chicago Bound. The six barges hold approximately 185,000 bushels, or more than 100 carloads.--Courtesy Dravo Corporation.

more than thirty barges, a string over a mile long, have been counted "tied off" along the bank of the Canal between miles 301 and 303.5--just below the entrance to the Sag Channel (fig. 65). Nearly half of them were grain barges.

Improvement of water equipment, as well as of operating techniques, to obtain the best possible service has helped to increase grain traffic on the waterway. A variety of barge types are currently in use. Small barges average between 27,000 and 30,000 bushels, and they are preferred for shipments through the Sag Channel. Jumbo barges, preferred by shippers for the long hauls southward, average between 80,000 and 100,000 bushels.

In-transit time varies greatly for barged grain. Under ideal conditions a barge can reach the Calumet area in one and one-half days from Joliet, two to

two and one-half days from Spring Valley and two and one-half to three days from Beardstown. William Webb, operator of the Des Plaines Valley Cooperative Association house at Joliet, reports a barge was loaded on October 31, dispatched to the Santa Fe elevator at Damen Avenue and the South Branch of the Chicago River (fig. 65), and returned on November 1; it was then reloaded and sent again to the Santa Fe elevator in time to be unloaded on the third of November. This turn-around time bettered rail between five and eight days. Although this is unusually fast,[1] it is indicative of speeds that are possible by water.

Certain operators specialize in grain transportation. Mechling Barge Lines, Incorporated of Joliet has pioneered much of the work. Marine Transit Company, John I. Hay Company, and Inland Waterways Corporation are also common carriers of grain on the Illinois Waterway. Other barge lines move only relatively small quantities of grain into Chicago.

Potential

The potential of grain traffic on the Illinois Waterway has not been reached. Figure 59 outlines the areas of the greatest production of corn, wheat, oats and soybeans which are accessible to the waterway. That these have not been fully exploited becomes clear upon determining the area currently supplying grain to riparian elevators (fig. 69)[2]. A part of this supply area ships to markets other than Chicago. River elevators below Peoria ship more than fifty per cent of the barged grain that they handle south to St. Louis, New Orleans, or to ports on the Tennessee or Cumberland Rivers. Above Peoria almost all barged grain moves to Chicago, except during annual periods of lock repairs.

---

[1]Webb, op.cit.

[2]This map was compiled from personal interviews with managers of the individual river elevators.

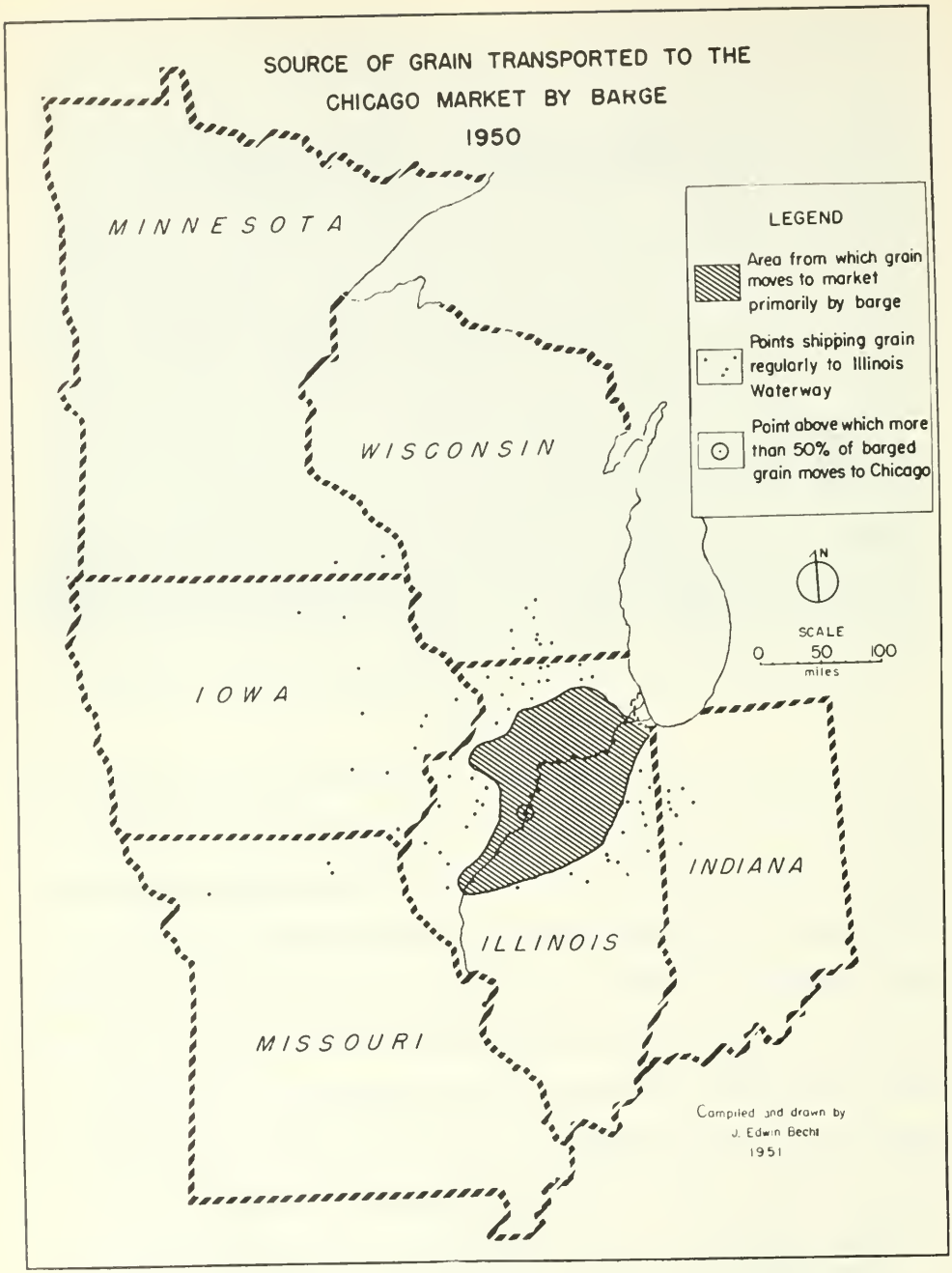

SOURCE OF GRAIN TRANSPORTED TO THE
CHICAGO MARKET BY BARGE
1950
MINNESOTA
WISCONSIN
IOWA
ILLINOIS
INDIANA
MISSOURI
LEGEND
Area from which grain moves to market primarily by barge
Points shipping grain regularly to Illinois Waterway
Point above which more than 50% of barged grain moves to Chicago
N
SCALE
0 50 100
miles
Compiled and drawn by
J. Edwin Becht
1951

Fig. 69

In addition to rate limitations other factors have also prevented the growth of the effective supply zone (fig. 69). Directly south of Chicago there is a small but intense livestock feeding area centered around Tinley Park, 14 miles east of Joliet. Also, these farmers are almost as close to the Chicago terminals by truck as they are to elevators at Lockport or Joliet, therefore expansion to the east is limited. Toward the southeast there is a growing awareness of the advantages of shipping by water and grain is moving to Joliet, Morris, and Lockport from points as distant as Paris, Illinois and Attica, Indiana.[1] However, processing plants at Decatur, Champaign, Gibson City and Bloomington provide competition due to in-transit milling privileges provided by rail. The area to the southeast of the supply zone is predominantly cash-grain[2] and will no doubt send limited annual increments to the waterway. To the north of the marked supply area, grain movements vacillate between sales to the Chicago market and to the dairy industry of southern Wisconsin, depending on crop yields and their effects on prices.[3] If yields are short in the dairy area, grain usually moves from northern Illinois to Wisconsin.[4] In years of surplus it is more likely to move to Chicago. Thus, this boundary migrates accordingly.

Other factors limit westward expansion. Between the Illinois and the Mississippi Rivers, there is another large feeder area.[5] Also, Mississippi River terminals draw from this area for the southbound trade. The Mississippi Valley is an area of low production for the four grains under consideration (fig. 70). In northwestern Illinois can be seen an area of heavy production out-

---

[1]Statement by Orland Lehnus, Norris Grain Co., personal interview.
[2]Illinois Post-War Planning Commission, "Illinois Resources", Chicago, Illinois, 1946, p.47.
[3]Lehnus, Webb, McClintock, op.cit.
[4]Bresenden, op.cit.
[5]Illinois Post-War Planning Commission, op.cit., p.47.

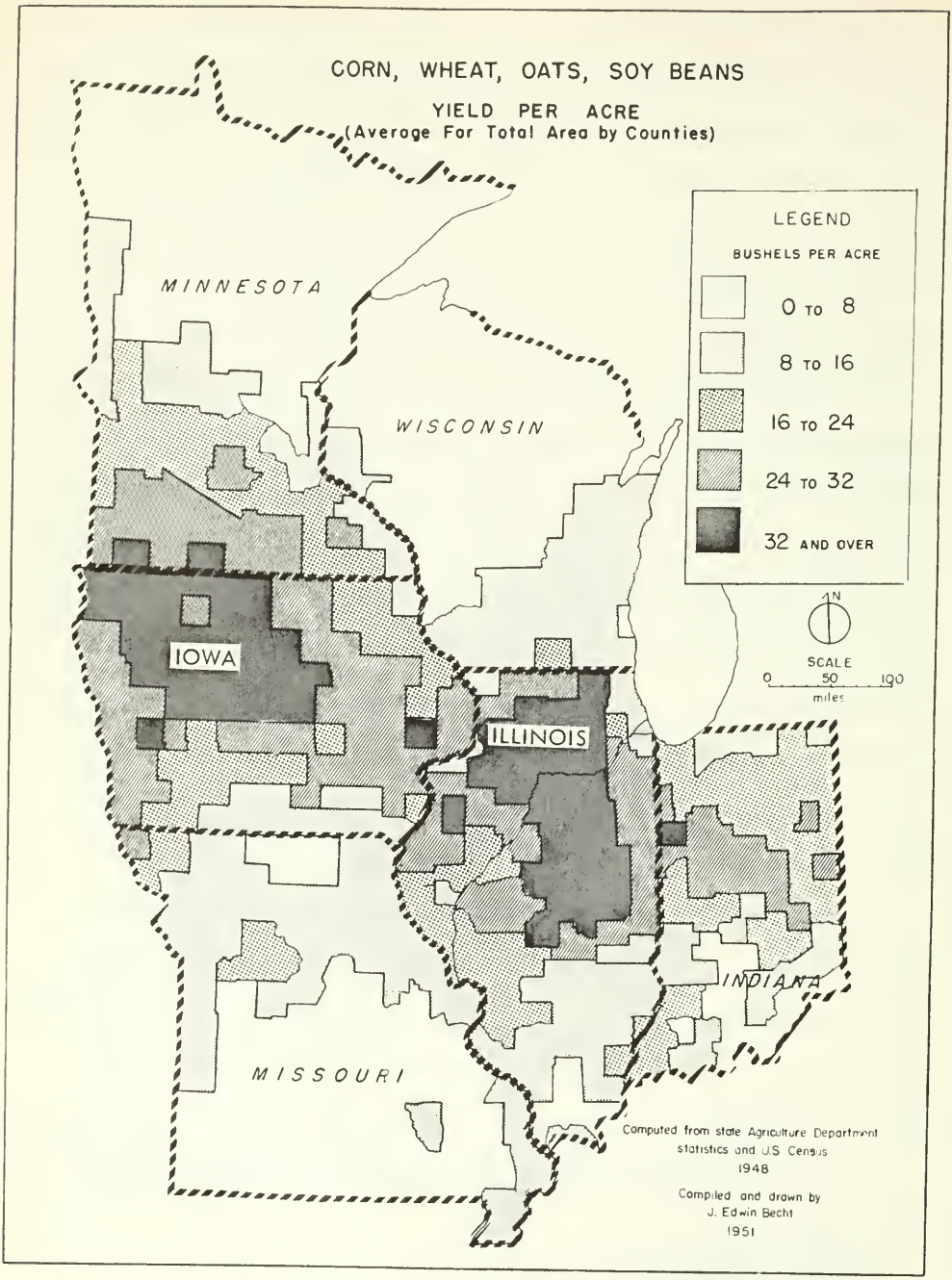

CORN, WHEAT, OATS, SOY BEANS
YIELD PER ACRE
(Average For Total Area by Counties)
LEGEND
BUSHELS PER ACRE
0 TO 8
8 TO 16
16 TO 24
24 TO 32
32 AND OVER
N
SCALE
0 50 100
miles
MINNESOTA
WISCONSIN
IOWA
ILLINOIS
INDIANA
MISSOURI
Computed from state Agriculture Department statistics and U.S. Census
1948
Compiled and drawn by
J. Edwin Becht
1951

Fig. 70

side of the present supply zone (fig. 70). At present it has primarily a livestock agriculture. To tap this area river elevators have recently been constructed at Hennepin and Spring Valley.

Published transportation rates are the most important factor in determining the distance grain can be trucked to the waterway. If it were not for the itinerant trucker it would be a completely dominant limitation but, as pointed out, grain moving to Chicago provides a load for trucks on what is normally a "back-haul" direction. Therefore, grain regularly moves to the waterway from points well beyond the line connecting points at which barge-truck rates equal rail rates (overlay fig. 70). The eight and one-half cent isophor per carload hundredweight on corn reflects the influence of truck and barge (overlay fig. 70). It reaches only a short distance from Chicago, and reflects competition with short-haul truck movements. It also points downstream depicting the low rail rate in response to barge competition.

The modernization of the Illinois-Mississippi Canal, formerly the Old Hennepin Canal, would greatly increase the area from which Chicago could barge grain. The isophor depression in east central Iowa would be eliminated and the grain supply area for riparian elevators would be pushed 150 miles to the west and northwest following the establishing of a six cent barge rate to Muscatine. This would permit trucks to reach a distance sufficiently far into Iowa to permit drawing of grain from heavy producing counties in Central Iowa (fig. 70).

Nearly all the supply zone of Chicago's barged grain falls within the truck-barge advantage area. This is determined by matching the two overlays in the pocket of the back cover over figure 70. Beyond the supply zone are isolated

supply points, which represent the sources of grain for the itinerant trucker working under a system of "back-haul" rates. Rate-wise there are areas on all sides into which the supply zone may expand with two exceptions, one to the northeast, the other to the southeast.

There is ample grain produced within the truck-barge rate advantage area to provide for more than twice the current traffic. The 1948 total yields of corn, wheat, soybeans, and oats from all counties entirely, or nearly within the favorable rate zone for water carriers northeast of a line drawn from northwest to southeast through Peoria,[1] was 341,548,000 bushels.[2] In that year only 35,883,000 bushels,[3] or 11 per cent of that total reached Chicago by barge. Comparable figures for 1949 were 324,471,000[4] bushels produced and 50,591,000[5] or 16 per cent of the total yield was barged to Chicago. An estimated total yield for 1950 corn, wheat, soybeans and oats in the delimited supply zones is 325,000,000, of which 59,931,000[6] or 18 per cent was barged to Chicago. To date less than one-fifth of all grain produced within the barge-truck advantage area has moved to Chicago by barge during any one year. Rail, truck, in-transit processing mills and livestock feeding account for more than four-fifths of all the grain produced, even where rates are favorable to barge.[7] The success

---

[1]Peoria was selected because "north of that city barged grain moves primarily to Chicago, south of it more than one-half of the grain moves to downstream markets".--A. L. Mechling, A. L. Mechling Barge Lines, Inc., personal interview.

[2]Illinois Co-operative Crop Reporting Service, Illinois Department of Agriculture, U.S. Department of Agriculture, "Illinois Agricultural Statistics 1950", Springfield, Illinois, 1950, pp.7-17.

[3]Statistical Department, Chicago Board of Trade, op.cit.

[4]Illinois Cooperative Crop Reporting Service, op.cit.

[5]Statistical Department, Chicago Board of Trade, op.cit.

[6]Ibid.

[7]Although some grain does move downstream from the delimited area it is probably offset by production from counties lying only partly within the zone, and also, by grain produced beyond the zone brought to the waterway by itinerant truckers. For purposes of this presentation the two factors are considered as in balance.

water carriers will have in gaining additional grain traffic will depend upon the degree to which they are successful in altering the marketing habits of farmers.

Changes in agricultural practices and marketing habits of farmers must be effected before the total area of truck-barge advantage can be increased. A change from livestock to cash grain for farmers of Western Illinois would approximately double grain shipping from these areas which include many heavy-producing counties (fig. 70).[1] A long range program establishing truck depots to make readily available back-haul loads at strategic locations would encourage truckers to come longer distances. Such a depot could be stocked with coal, fencing, fertilizers, agricultural limestone, phosphate, lumber and other items normally marketed by rural distributing centers.

Most of the readily available grain traffic appears to be already moving on the waterway and the rate of increase is already leveling off (fig. 71). Future

ANNUAL TONNAGE OF GRAIN SHIPMENTS
OVER THE ILLINOIS WATERWAY*

Year	Net Tons
1936	143,820
1937	260,444
1938	693,133
1939	673,627
1940	655,076
1941	570,984
1942	520,701
1943	466,880
1944	805,685
1945	609,013
1946	680,992
1947	942,534
1948	1,049,792
1949	1,423,947

*Source: Corps of Engineers, U. S. Army.

Fig. 71

[1]Illinois Post-War Planning Commission, op.cit.

increments will depend on further percentage-wise rate increases, on canal improvements, on changes in types of agriculture, on increasing awareness of back-haul possibilities, on establishment of truck and merchandising depots and on the construction of more riparian processing plants.

There are also changes under consideration that might reduce the potential of the barge grain supply zone. One is the reduction of rates by western trunk railroads. They have been attempting to have eastern routes absorb some of the proposed reduction, but the eastern railroads have been reluctant to do this because of rising costs and the fact it would not add to their volume. Therefore, if such action is to be taken, the western lines will have to reduce rates on their share of a Chicago proportional. This can be done with profitable results according to the Chicago Board of Trade.[1]

Furthermore, the construction of additional inland processing plants providing certain in-transit rate privileges will favor rail traffic. A system of immediate inspection at rail shipping points would insure farmers of the value of grain when shipped and also make possible more rapid payments. This would draw some grain from the river. The box car shortage has also favored the use of whatever transport can be secured. As a result, much grain has gone to market by barge for this reason alone,[2] and a plentiful supply of suitable rolling stock will return some of the traffic to the railroads.

Summary

In summary it should be pointed out that a vastly changed transport pattern for grain has evolved in Midwestern United States in the last eighteen years.

---

[1]Statement by Roy D. Erickson, Transportation Department, Chicago Board of Trade, personal interview.

[2]Statement by W. W. Gardner, Dewey and Co., Pekin, Illinois, personal interview.

New river elevators have been completed, new transhipping terminals constructed and river cargo carriers organized to move vast tonnages. If the present trends continue barged grain in Chicago will be equal to the total delivered by rail in less than ten years. Economies in shipping grain on the Illinois Waterway will not only influence further development and use of inland rivers and canals but will also further effect changes in the patterns of rail rates and truck movements.

V. TRAFFIC PATTERNS OF SECONDARY COMMODITIES BARGED TO AND FROM CHICAGO

Introduction

In 1949 the total tonnage of all commodities other than coal, sand and gravel, petroleum, and grain moved on the Illinois Waterway amounted to 2,557,017 net tons, or about 20 per cent of the grand total.[1] Many types of cargoes form this tonnage. Of these only sulphur, iron and steel are outstanding. Therefore, the organization of this chapter is not based on tonnage of any one commodity but rather on kinds. The classifications are 1) metallic and non-metallic minerals, 2) partly processed and finished products other than foods, 3) agricultural and forest products other than foods, 4) foods, and 5) other commodities potentially available for Chicago barge traffic. Due to the great variety of chemicals making up the waterway traffic, these are discussed in a special section entitled "Chemicals" (page 157) and are included under the subdivision treating partly processed and finished products other than foods.

---

[1]Department of the Army, Corps of Engineers.

A. METALLIC AND NON-METALLIC MINERALS

Sulphur

There are three minerals barged into Chicago in the raw, or nearly raw state. They are sulphur, fluorspar and phosphate. Of these sulphur is by far the most important to the waterway. In 1949, 528,488 net tons[1] or approximately 4 per cent of the waterway's total tonnage was northbound sulphur. Of this about 340,000 net tons reached Chicago area consignees, and almost the entire balance was transhipped to lake vessel for movement to various other lake ports. Fluorspar and phosphate are barged in relatively small quantities.

Barge transportation of sulphur is important to the many chemical plants of Chicago and to the paper manufacturing ports of the Great Lakes. Sulphur production at one end of the Illinois-Mississippi Waterway and a great market at the other, plus the nature of the product, result in sulphur being well adapted to barge movement. Sulphur extraction along the Gulf of Mexico is such that the product can move by short rail haul to barge loading points at Galveston, and Freeport, Texas, and in the Louisiana producing district it can be loaded directly into barges at Port Sulphur. On a nationwide basis approximately 80 per cent of the sulphur is produced in Texas.[2] However, the ratio is not that high in regard to barged sulphur, with only about two-thirds of it originating in Texas.[3]

---

[1]Ibid.

[2]U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook, Review of 1945, (Washington, D.C., Government Printing Office, 1947), p.1379.

[3]Huggett, op.cit.

Sulphur moves to Chicago by bargeload lots and is unloaded mainly at the Western Avenue docks of the North Pier Terminal Company. It then moves by rail to such inland points as the Hammond, Indiana, plant of Wilson and Company.[1] It is also unloaded at the docks of some riparian chemical companies, one example being the General Chemical Company located on the east bank of the Calumet River. Most of the transhipping to lake vessel occurs at the lake-front docks of the North Pier Terminal Company.[2]

Fluorspar

Fluorspar shipments are relatively few and the annual tonnage is very modest as compared with sulphur. Fluorspar requirements of many steel producers are so small that special facilities for barge shipments of this mineral would be idle most of the time. In winter, if the mineral is frozen aboard barge it is more difficult to thaw than when in rail cars.[3] Consequently, many steel mills still rely on rail shipments.

Fluorspar extraction is ideally located for loading the product into barges so this advantage offsets some of the disadvantages. Approximately three-fourths of the fluorspar production of the United States comes from a small area in extreme southern Illinois and adjacent parts of Western Kentucky.[4] Only short truck hauls are required to transport the fluorspar to the barges. Terminals at Rosiclare and Cave-in-Rock, Illinois, and at Smithland, Kentucky ship more than 90 per cent of barged fluorspar.[5] About 75 cents a net ton is saved on fluorspar barged into Chicago.

---

[1]Horn, op.cit.
[2]Huggett, op.cit.
[3]Moore and Huebner, op.cit.
[4]Minerals Yearbook, op.cit., pp.1424-25.
[5]Eaton, op.cit.

At Chicago it is unloaded at various steel mills. The two main users are the Inland Steel Corporation Mills which receive about 10,000 net tons annually[1] and the Carnegie Illinois Steel Corporation[2] which barges approximately an equal amount.

It may be that dwindling supplies of fluorspar, plus an increased demand for it--due to its use in separating U-235 from uranium in atom power production--will force the price of fluorspar upward which will decrease its adaptibility to water transportation. It may be these conditions will result in other sources being developed. In fact, some fluorspar has already been shipped to Chicago from Mexico having been transhipped from rail to barge at Brownsville, Texas.[3] Current prospects appear slight for the development of outstanding tonnages of fluorspar on the Illinois Waterway.

Phosphate

On the other hand, indications are that phosphates will, in time, constitute large tonnages for barge operators. Two classes of shippers are interested in phosphates, 1) the chemical companies and 2) distributors of agricultural phosphates. The first of these has already developed to a point where plant docks have been constructed to receive barge shipments. The second can follow patterns used in the distribution of agricultural limestone, that is, unloading from barges spotted at strategic points directly into trucks for distribution to farms. Phosphates barged to Chicago are of direct concern to the industries of that city; although less direct in their relation to Chicago, agricultural phosphates

---

[1] Flinn, op.cit.
[2] Huebner, op.cit.
[3] Letter from M. P. Hamby, Port of Brownsville, December 5, 1950.

are of equal, if not greater, importance due to the necessity for replenishing soil minerals in Illinois.[1]

A total savings of $1.43 per gross ton can be effected on barge shipments of phosphates from Florida[2] to Joliet, Illinois. The rail rate is $9.43 per gross ton and the total barge cost is $8.09 per gross ton.[3] The $8.09 barge rate is broken down as follows:

Mines to Tampa by rail	$1.24
Loading and Trimming	.28
Wharfage	.35
On barge or boat, Tampa	$1.87
Put in New Orleans	1.72
Loading and Trans. to Joliet	4.50
Total	$8.09

For the satisfactory operation of a large chemical works using phosphate rock, carload quantities are insufficient. The requisite volume lends the product to barge operations and to an endless-belt plant process. The savings in paper work alone by using the waterway is an important aspect of phosphate traffic control.[4]

The distribution techniques for agriculture phosphate do not lend themselves to barge operations at present.[5] This is true even though the waterway traverses some of the states' largest phosphate-consuming counties. The difficulty is due to the fine texture required for soil application, and the necessity to keep the product dry. Both make it difficult to store or transport in large

---

[1]Statement by Leonard W. Braham, Will County Cooperative Association, personal interview.

[2]Florida is considered as a source because, although Tennessee deposits are closer and have the advantage of cheaper rates, their reserves are too low to supply the demand.

[3]Statement by Lawrence Nelson, Blockson Chemical Company, personal interview.

[4]Ibid.

[5]Braham, op.cit.

quantities. However, if the disparity in rates continues to increase it will soon reach a point at which it will pay to construct reprocessing plants at strategic locations and provide storage warehouses capable of holding 8,000 to 10,000 gross tons of barged phosphate rock. Storage space must be provided because farmers usually buy enmasse as phosphates must be spread when seasonal work allows and then only under ideal weather conditions. This means that a whole new pattern of the marketing of agricultural phosphates must develop before barge shipments can reach their potential. That such is not impossible is witnessed by current grain marketing patterns pointed out in Chapter IV as having evolved in the last fifteen years.

Manganese

The Illinois Waterway carries important quantities of manganese for the iron and steel industries of Chicago. The United States obtains manganese ore from several overseas sources, the principal ones being Gold Coast, Soviet Union, Cuba, India, Brazil and Chile.[1] New Orleans as a port-of-entry can be considered as an important domestic originating point. Several bargeloads a month are brought northward and under a wartime emergency the shipments could be expected to more than double.[2]

---

[1]Bureau of Mines and Geological Survey, Department of the Interior, Mineral Resources of The United States, Public Affairs Press, Washington, D.C., 1948, p.130.

[2]Eaton, op.cit.

B. PARTLY PROCESSED AND FINISHED PRODUCTS OTHER THAN FOODS

Introduction

Of all the partly processed and finished products other than foods, iron and steel are by far the most important in respect to ton miles barged. The chemical industry is next in importance and is growing rapidly.[1] Also of importance and of barge-size shipments are paper and fibre board, magnesium, and lead. Still other cargoes forming less than carload shipments are numerous and represent many degrees of processing. The list would include burlap bags, sugar bags, closet bowls, bicycles, scrap rubber, animal dip, empty drums, electrical machinery, beer bottles, and twine. Nor does this by any means complete the list.[2]

Iron and Steel

Iron and steel are of outstanding importance to Illinois Waterway traffic in that their tonnage currently leads all water-borne commodities other than petroleum southbound out of Chicago and thus provides pay loads on the back haul. In 1950 the total net tonnage clearing Brandon Road Lock was 521,712.[3] Of this about 65 per cent, or 332,906 net tons, moved south.[4] The only other downbound commodity of comparable volume in 1950 was petroleum, amounting

---

[1]Innes, op.cit.

[2]Huggett, Horn, and Innes, op.cit.

[3]Preliminary lock records, Corps of Engineers, U.S. Army. The rate of increase has been so rapid that the latest available data is used so as to provide as accurate a description as possible. Preliminary data for 1950 is available only for coal, sand and gravel, petroleum products, grain, iron and steel, and sulphur. Hence 1949 records are used for all other commodities.

[4]Ibid.

to 368,540 net tons.[1] Totals of all other southbound commodities are small in comparison, excepting grain. Four hundred and nine thousand eight hundred and seventeen net tons of grain passed downbound through the New La Grange locks,[2] in 1950, having been collected along the way rather than originating in Chicago. Greater Chicago has many large steel mills close to, or accessible to, the waterway (fig. 72), and increasing industrialization near the southern reaches of the Mississippi may create a greater demand for Chicago iron and steel in the south.

Shipments of iron and steel products over the Illinois Waterway were irregular until 1946. Beginning with 1946 the increase has been sharp and fairly uniform (fig. 73). During World War II transportation costs were generally regarded as subordinate to time considerations with a resultant decrease in waterway steel and iron traffic. With post-war rail rate increases transport costs have become of increasing concern and this has effected a net tonnage increase from 99,473[3] in 1946 to an estimated 522,000 in 1950.[4] Currently, due to demand, time is usually more important than transport costs to the final consumer, and as a result, most of the iron and steel moving by barge is either intra-manufacturing organization or between plant and distributing warehouses. In either case, the expenses are chargeable to the processing, or operating costs, of one company. In this regard an assured demand stimulates water traffic because there is no incentive to hurriedly place a product on the market at a financial sacrifice. "Cost-plus" contracts would naturally be an exception to this generalization.

---

[1] Ibid.
[2] Ibid.
[3] Corps of Engineers, U.S. Army.
[4] Preliminary lock records, op.cit.

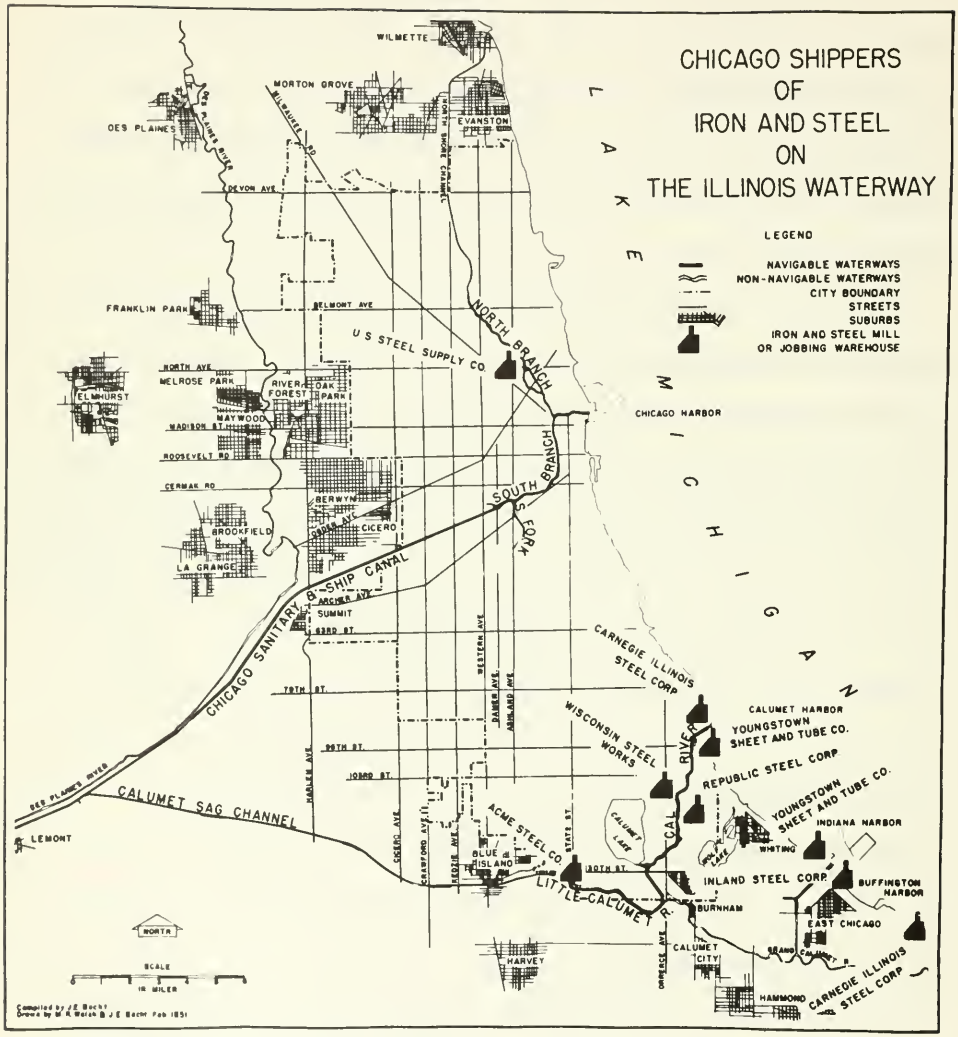

CHICAGO SHIPPERS
OF
IRON AND STEEL
ON
THE ILLINOIS WATERWAY
LEGEND
NAVIGABLE WATERWAYS
NON-NAVIGABLE WATERWAYS
CITY BOUNDARY
STREETS
SUBURBS
IRON AND STEEL MILL
OR JOBBING WAREHOUSE
LAKE MICHIGAN
WILMETTE
MORTON GROVE
EVANSTON
DES PLAINES
DES PLAINES RIVER
DEVON AVE
FRANKLIN PARK
BELMONT AVE
NORTH BRANCH
U S STEEL SUPPLY CO
CHICAGO HARBOR
NORTH AVE
MELROSE PARK
RIVER FOREST
OAK PARK
ELMHURST
MADISON ST
ROOSEVELT RD
CERMAK RD
BERWYN
CICERO
SOUTH BRANCH
SOUTH FORK
BROOKFIELD
LA GRANGE
CHICAGO SANITARY & SHIP CANAL
ARCHER AVE
SUMMIT
63RD ST
CARNEGIE ILLINOIS STEEL CORP
79TH ST
WESTERN AVE
PARNELL AVE
ASHLAND AVE
WISCONSIN STEEL WORKS
CALUMET HARBOR
YOUNGSTOWN SHEET AND TUBE CO.
CALUMET RIVER
REPUBLIC STEEL CORP
DES PLAINES RIVER
CALUMET SAG CHANNEL
89TH ST
HARLEM AVE
LEMONT
103RD ST
CICERO AVE
CRAWFORD AVE
KEDZIE AVE
ACME STEEL CO
BLUE ISLAND
STATE ST
CALUMET LAKE
YOUNGSTOWN SHEET AND TUBE CO.
INDIANA HARBOR
WHITING
POST LAKE
130TH ST
INLAND STEEL CORP
BUFFINGTON HARBOR
LITTLE CALUMET R.
BURNHAM
EAST CHICAGO
CALUMET CITY
GRAND CALUMET R.
HARVEY
CARNEGIE ILLINOIS STEEL CORP
HAMMOND
NORTH
SCALE
1 MILES

Fig. 72

ANNUAL TONNAGE OF IRON AND STEEL SHIPMENTS
OVER THE ILLINOIS WATERWAY*

Year	Net Tons
1936	59,115
1937	72,545
1938	66,266
1939	51,863
1940	139,626
1941	93,907
1942	38,708
1943	64,468
1944	66,879
1945	115,485
1946	99,473
1947	115,949
1948	186,650
1949	335,676

*Source: Corps of Engineers, U.S. Army.

Fig. 73

Under special conditions barge shipments of iron and steel are economical, in spite of supposed lost time, for even inter-company shipments. This is true for products of a certain type turned out in chain rolls two or three times a year. For example, tractor treads cut from specially rolled bars are barged to the Caterpillar Products factory at East Peoria, Illinois, in large shipments which occur only two or three times annually.[1] Another set of conditions is existent in some companies obtaining all, or nearly all, of their raw materials by water. To do this some concerns maintain their own slips, docks, cranes and intra-plant rail cars, or trucks. An example of this type of works is the Keystone Steel and Wire Company of Peoria, Illinois. It obtains scrap iron from various river points; pig iron from Chicago, St. Louis, or Europe, ingots from Chicago or Alton, Illinois, fluorspar from Rosiclare, Illinois or Smithland, Kentucky.

[1]Statement by Keith Hopkins, Caterpillar Products Corp., personal interview.

Ferro-manganese is imported through New Orleans, coke from Chicago, and fuel oil from Wood River, Illinois or Baton Rouge, Louisiana. Transport savings effected by this company's use of water transport exceed $100,000 annually.[1] The above combinations or types of conditions have resulted in the rapid growth of iron and steel traffic during the last five years.

The fact that most steel mills, and processors of iron and steel were located in respect to rail facilities rather than water, even though on a riparian site, is a disadvantage. As a result the intra-plant terminal costs to load barges average about ten cents a hundred pounds. The cost to load barges is, of course, much greater for non-riparian plants.[2] Also, these costs may vary according to season. This is true for some large shippers located on the south shores of Lake Michigan. When Lake Michigan is open for navigation and barges can be towed to either Chicago or Calumet harbors the cost of loading a barge is $1.00 per net ton. During the winter when they must use rail or truck to reach docks this cost is $2.20.[3] These figures illustrate one cost advantage of a riparian site.

Much new construction of iron and steel-using factories is occurring along the waterway. Outstanding among them is the multimillion dollar Caterpillar Products plant immediately south of Joliet. The International Harvester Company[4] and the U. S. Steel Supply Company[5] are among others also planning additional waterway facilities. So a continued upward trend, as indicated in figure 73, appears justified; for, as the direct results of proven advantages accrue to a few pioneer plants, other companies will likely be forced to follow wherever their

---

[1]Statement by Roy Eaton, Keystone Steel and Wire Co., personal interview.
[2]Statement by H. M. Huebner, Carnegie-Illinois Steel Corp., personal interview.
[3]Ibid.
[4]Statement by John Moore, International Harvester Co., personal interview.
[5]Statement by Fred Eiselstein, U.S. Steel Supply Co., personal interview.

situation permits. This awakening consciousness of the advantages of barge use is an important contributing factor in recent increases of barge transportation.

The operational requirements of the International Harvester Company not only makes it an important segment of total iron and steel traffic but illustrate exceptionally well the intra-organizational type of barge operation. For the most part International barges raw materials or semi-finished products but they do ship tractors and other agriculture machinery on occasions, especially from Louisville, Kentucky to Memphis, Vicksburg, New Orleans, Houston and other southern distributing points located on the inland waterways. Outstanding among their barge operations are shipments to and from their captive Wisconsin Steel Mill located in South Chicago. Finished steel and pig iron move to Copperas Creek on the Illinois River, and are then trucked seventeen miles to the company's Canton, Illinois agricultural implement factory (fig. 74). Scrap iron is returned along the same route (fig. 75). A savings of $1.95 a net ton results on movements of finished products from the Wisconsin plant and $1.25 on pig iron (fig. 76).

The Wisconsin plant also ships by barge to International Harvester's Louisville, Kentucky factory. On this movement the rail rate would be $10.20; the water rate is $5.77, broken down as follows: 35 cents handling at plant, $3.86 barge rate, $1.05 Ohio River Transit, 15 cents at Port of Louisville, 36 cents switching rate. International's Stockton, California plant is also reached from the Wisconsin steel plant by all-water route through New Orleans. International would also have considerable traffic for the Hennepin Canal if it is ever rebuilt. The canal was last used by them in 1945. In 1949 alone more than 62,000 net tons were moved by barge from Chicago to Moline in spite of the circuitous

Fig. 74--Bars and pig iron from the Wisconsin Steel Plant destined for the International Harvester Plant at Canton, Illinois being unloaded at Copperas Creek. It is moved by truck the last seventeen miles to the plant at Canton.

route via Grafton--at the junction of the Mississippi and the Illinois Rivers. In addition to their using the Illinois Waterway, the International Harvester Company also ships by barge on the Ohio and Mississippi Rivers and the intracoastal canal. Of their major factories only the Harvester plant in Indianapolis does not have access to water transportation.[1]

[1]Moore, op.cit.

Fig. 75--Scrap trucked from the Canton, Illinois International Harvester factory to be barged from Copperas Creek to the Wisconsin Steel Plant in Chicago. Notice the dump truck ramp in the upper left.

Another example of the effective use of water for the movement of iron and steel products is shown by the fact that nine of fourteen jobbing warehouses of the U.S. Steel Supply Company, a subsidiary of the U.S. Steel Corporation, can be reached via the Illinois Waterway. Their warehouses are located at Boston, Newark, Baltimore, Milwaukee, Cleveland, San Francisco, Los Angeles, Portland,

COMPARATIVE RAIL AND BARGE RATES*
ON A NET TON OF FINISHED STEEL AND PIG IRON
FROM CHICAGO TO CANTON, ILLINOIS

Finished Steel			
By Rail		By Barge	
		Handling at plant	$ .35
		Barge rate	1.10
		Unloading	.90
		Truck to Canton	.70
Total	$5.00	Total	$3.05
Pig Iron			
		Handling at plant	$ .35
		Barge rate	.83
		Unloading	.40
		Truck to Canton	.50
Total	$3.33	Total	$2.08

*Statement by John Moore, International Harvester Co., personal interview.

Fig. 76

Seattle, St. Paul, St. Louis, Pittsburgh and Moline. The last nine receive ex-barge shipments from Chicago. Eleven barges to St. Louis alone saved the company more than $23,000 in one season.[1] U.S. Steel Supply finds it can save $4.93 a ton to St. Paul, in spite of the necessary roundabout route. The rail rate to the west coast is $1.48 a hundred pounds or $29.60 a net ton. By barge it is less than $24.00. On one bargeload of 800 net tons of steel shipped to the west coast--by barge to New Orleans and ocean vessel beyond--a savings of $4,480 can be realized.

Until post-war rail car shortages forced many iron and steel shippers to turn to the all-water route, or rail-barge-steamer-truck route, it was thought that the transhipping and time factors would consume all profits. Experience

[1]Eiselstein, op.cit.

has shown, however, such is not always the case.[1] The greatest difficulty apparently is in timing barge shipments so as to meet steamer sailing dates. The irregularities and uncertainties in towboat schedules are the chief obstacles to an even greater use of this route.

The potential area for the marketing of iron and steel from Chicago is broad. In the first eleven months of 1950 the Carnegie Illinois Steel Corporation shipped 62 bargeloads. Their destinations were as follows:[2]

St. Louis	21	Peoria	3	Cairo	1
Houston	18	Harvey (La.)	3	Baton Rouge	1
Minneapolis	4	Orange (Tex.)	2	Corpus Christi	1
New Orleans	4	Memphis	2	Knoxville	1

Although these should not be taken as typical of the entire industry, they do indicate the wide distribution possible by barge--as well as the two outstanding recipients of Carnegie iron and steel, St. Louis and Houston.

A wide variety of iron and steel products are barged. As indicated, pig iron, and plates, strip, bars, sheets, wire, billots, and ingots make up the majority of the tonnage of these products carried by water. There is a wide range of more completely processed commodities such as oil and gas pipe for the Gulf Coast fields, tanks, galvanized sheets, tin plate and many others. River maintenance projects alone provide many consumers of iron and steel. Cofferdam pilings are frequently shipped by water. Prefabricated structural members floated in barges directly beneath their final point of assembly facilitates bridge, dock and other construction (fig. 77). The range of iron and steel commodities adapted to water transport is great. The variety is limited more by a lack of volume, by a lack of time, and by value considerations rather than restrictions of location.

---

[1]Moore, op.cit.
[2]Huebner, op.cit.

Fig. 77--Three heavily loaded barges of iron and steel downbound in passing place No. 3 of the Sag Channel. The barge in the foreground contains cofferdam pilings headed for the Tennessee River. The next barge holds structural members for the new Illinois Central Railroad bridge over the Ohio River (at Cairo, Illinois). The lead barge is loaded with coiled wire for St. Louis. Note the more lightly-loaded "Spencer" of the Blaski Barge Co. passing with two empties and one barge of coke.

The growth of iron and steel traffic is due to several factors. Rail rate increases, development of new facilities and operational techniques are important, as are the increased availability of waterway facilities and equipment. This traffic can be expected to continue to increase on the basis of intra-organizational trade, and of plants so located as to incorporate barge loading and unloading within the plant process. Construction projects near the waterways, especially large or bulky products, such as tanks, and river maintenance will assure other shipments. Based on these considerations alone, iron and steel traffic

should exceed 1,000,000 net tons annually. As regards inter-organizational shipments the present method of marketing iron and steel f.o.b. at the mill will seriously restrict their movement by water until the exigencies of current demand for increasing production at any cost have passed. When consumers again must be concerned about transportation costs rather than time, then the total traffic may exceed 2,500,000 net tons annually.

Chemicals

The second group of this class of barge commodities on the Illinois Waterway are chemicals. The chemical industries more and more are turning to water transport to satisfy their shipping requirements. In the past the Illinois Waterway has provided low cost transport for many raw materials such as sulphur and phosphate required by the chemical plants of Chicago. This is no longer the complete picture, because, although the waterway still carries large quantities of raw materials northward, it also transports many processed and partly processed chemicals in the same direction from the sprawling chemical empire of the Gulf Coast as well. World War II touched off the chemical expansion of the Texas Gulf Coast. Since 1940 more than $1,000,000,000 has been invested in the construction of over 80 plants producing chemicals and allied products in Louisiana coastal parishes and Texas coastal counties.[1]

Chicago's receipts of Gulf Coast chemicals by barge reflect the many products produced in Louisiana and Texas. One company alone barges thirty different packaged chemicals to Chicago.[2] In addition, bulk shipments of this

---

[1]South Texas National Bank, Chemicals In The Gulf Coast, Houston, Texas, January 1950, p.26.

[2]Letter from Oliver E. Beutel, The Dow Chemical Company, November 22, 1950.

company include such commodities as hydrochloric acid--shipped in its own barges--and glycol, caustic soda solution, and benzol--in chartered equipment.[1] Another large chemical concern began water shipments early in 1951. The commodities included were chlorine, liquid caustic soda, and soda ash. They were moved from Lake Charles, Louisiana and Corpus Christi, Texas to Joliet and Chicago, Illinois.[2]

Southbound chemicals shipped by barge from Chicago are limited. Soap, industrial detergents, and domestic cleaning compounds are the main commodities. By utilizing barge service on these items the shippers are able to save from 12 to 20 per cent of their transportation costs.[3]

Chemical traffic should increase greatly in the near future. Much potential chemical traffic has been prevented from moving by barge due to a lack of proper equipment. Construction since World War II has changed this, especially as regards barges and pumping equipment to handle acids. Shipments of mixed cargoes in some instances, and the ordering of joint cargoes by two or more receivers are administrative devices that have permitted the barging of many chemicals needed only in less than bargeload quantities. The traffic in chemicals on the Illinois Waterway is just beginning and should reach an annual total of several hundred thousand net tons.

Paper

Numerous types of paper are transported to and from Chicago by barge. The grades include coated printing paper, newsprint, various grades of kraft

---

[1] Ibid.

[2] Letter from Frank G. Moore, Southern Alkali Corporation, January 17, 1951.

[3] Letter from G. F. Talley, Swift and Company, December 18, 1950.

paper, and container papers for such items as paper milk cartons. By virtue of low back haul rates, scrap paper is barged to New Orleans. Paper and pulp board and roofing paper are additional categories moving into Chicago by barge.

The moving of paper products by barge is increasing rapidly. The total tonnage of paper products shipped increased more than five-fold between 1947 and 1949. In 1947 less than 20,000 net tons of paper were moved on the Illinois Waterway[1] whereas in 1949 the total exceeded 100,000 net tons.[2]

Time, Incorporated of Chicago has been one of the outstanding users of the waterway in order to bring in their paper supplies. For more than ten years this company has been receiving barge shipments of machine coated printing paper from Houston, Texas, and unloading it at their own warehouse at Halsted Street and the South Branch of the Chicago River. Within the last few years the same commodity has been received via ocean freight from Portland, Oregon through New Orleans and thence by barge to Chicago.[3]

Although the in-transit storage is considered as an important benefit, as it takes from four to five weeks longer than rail shipments, the use of barge is justified on transportation savings alone. Rate studies reveal the following cost figures:[4]

Houston to Chicago

Rail rate	$12.98 per net ton
Barge rate	6.35 per net ton*

Portland to Chicago

Rail rate	$38.93 per net ton
Combination Water rate	31.22 per net ton*

*Includes loading and unloading costs. All rates include 3 per cent transportation tax.

---

[1]The American Waterway Operators, Inc., op.cit.
[2]Department of the Army, Corps of Engineers.
[3]Letter from W. A. Evans, Time, Incorporated, January 2, 1951.
[4]Ibid.

The in-transit warehousing benefit, however, is real and is exceedingly flexible. Its degree of value depends upon such conditions as the availability of ownership or warehouse facilities at either end of the route, the possible terminal use of the barge for storage, or use of carrier terminal facilities.

Newsprint is barged south from Chicago. In 1949 more than 6,000 net tons of newsprint moved from Three Rivers, Quebec to Chicago via lake vessel.[1] At the lake front terminal of the North Pier Terminal Company it was transhipped to barges for movement to St. Louis and Memphis.[2] With the growing scarcity of newsprint that has developed since the Korean War this traffic has ceased and reverted back to rail. Here is an example of balanced demand and production discouraging shipments by water. The backlog necessary to fill the slower moving water supply line is not economically available.

Although the Illinois-Mississippi Waterway has access to many southern paper mills, especially along the Intracoastal Waterway, relatively little paper is moving by barge at present. The reason given for this is that the customer is now paying transportation costs and, as there is a backlog on filling orders, there is a demand for as rapid delivery as possible.[3] However, paper manufacturers are interested in the maintenance of inland waterways in order to keep rail rates as low as possible. This interest is manifested in various ways: standby facilities are maintained by some,[4] others plan to resort to barge shipments,[5] and some concerns ship by water whenever time permits.[6]

---

[1]Huggett, op.cit.
[2]Ibid.
[3]Letter from J. Percy Thompson, Gaylord Container Corporation, November 21, 1950.
[4]Letter from I. Y. East, International Paper Company, November 10, 1950.
[5]Ibid.
[6]Thompson, op.cit.

Inland plants of paper manufacturers find it impracticable to use the waterways. Additional handling required at transfer points results in additional transshipping costs, too great a delay, and also means added susceptibility to damage. Furthermore, once paper is loaded aboard rail cars, short hauls are excessively costly when compared with proportional rates for longer hauls.[1]

In contrast to these inland paper mills some riparian plants use barges for gathering raw materials as well as shipping the finished product. The Houston plant of the Champion Paper and Fibre Company is an example. Here pulpwood, salt and chemicals are accumulated at the mill by barge, and markets on the Intracoastal Canal, Mississippi River and tributaries are served in like manner.[2]

Scrap paper as well as newsprint moves south. The Celotex Corporation ships scrap paper from Chicago to New Orleans at an average rate of 2,000 net tons per month.[3] The paper is used to give a smooth surface to wallboard made from bagasse.[4] The low back-haul rates that apply to scrap paper are evidenced by the difficulty currently encountered in obtaining barges for this traffic. The volume of scrap paper barged south could be doubled if the necessary bottoms were not assigned for iron and steel cargoes which yield more ton miles per twenty-four hours.[5] In view of the unbalanced direction of traffic as pointed out in Chapter II this situation should not last and sufficient barges should soon be available for this traffic--at least during the off seasons for such commodities

---

[1]Letter from C. E. Jones, International Paper Company, November 13, 1950, and letter from Edward K. Ahrens, Calcasieu Paper Company, November 28, 1950

[2]Letter from J. K. Truitt, The Champion Paper and Fibre Company, December 27, 1950.

[3]Statement by A. Brock, Celotex Corporation, personal interview.

[4]Bagasse is the fibre remaining from sugar cane stalks after it has been pressed for its juice.

[5]Brock, op.cit.

as sand and gravel. During the period of movement for sand and gravel, short hauls characterize their traffic pattern. Therefore, sand and gravel equipment cannot be released for the long periods necessary to carry scrap paper to points as distant as New Orleans.

Wallboard is shipped north to Chicago by the Celotex Company. Most of these shipments are of carload, or less than carload size, hence are moved only by the Inland Waterway Corporation.[1] Chicago is a transhipping point for wallboard destined for all southern Wisconsin, northeastern Illinois, northern Indiana, and Michigan.[2]

Paper bags are another paper product that moves by water. The volume of paper bag traffic is potentially much greater than is currently barged. Ordinarily bags are not stock-piled by the manufacturer as they are usually made to certain specifications so there is a need for hurried delivery. However, many large users, such as certain chain store systems, stock their own supplies of bags and these could move by water if their delivery were not so urgent as is presently the case. In 1950 one company shipped 600 net tons by barge; if demand were less urgent this same concern could ship four or five times that amount by water.[3] This is but another example of the adverse manner in which "boom times" affect barge traffic.

In summary it can be stated 1) that traffic in paper on the Illinois Waterway currently amounts to more than 100,000 net tons annually; 2) that a large variety of paper types is carried on the waterway, 3) that scrap paper constitutes a needed sizeable southbound commodity; and 4) indications are that the total net

---

[1]As pointed out in Chapter II the Inland Waterway Corp. is the only carrier operating on the Illinois Waterway that solicits less than bargeload lots.

[2]Brock, op.cit.

[3]Statement by E. A. Johnson, Bemis Bag Company, personal interview.

tons annually barged on the Illinois Waterway will be more than doubled in the next three or four years.

Aluminum and Magnesium

Other cargoes available for barge shipment because of the location of production and consumption centers are found among the light metals. Many aluminum and magnesium producing works are located along the Illinois-Mississippi Waterway or its navigable tributaries. Alumina reduction plants are located at Alcoa, Tennessee, and Listerhill, Alabama, both on the Tennessee River. Alumina concentration plants are at East St. Louis, Baton Rouge, Louisiana, and Mobile, Alabama. Magnesium recovery units are located at Lake Charles, Louisiana and at Freeport and Velasco, Texas. The latter, however, is the only magnesium plant on the waterway currently in production.[1] Barge transport is used in varying degrees at all these points.

The chief form of aluminum or magnesium barged on the Illinois Waterway is pig (fig. 78). For aluminum the waterway is circuitous to much of its market, which is in northeastern United States and in various aircraft producing centers of the west. As a result less than 2,000 net tons were barged into Chicago in 1948, about one-half of which was pig.[2] Though no recent figures are available the trend is upward.[3] Magnesium, though not moving in quantity until 1950, should have a greater traffic potential for Illinois River carriers than aluminum. The reason for this is that the water route between producing points and market is more direct, and the haul is longer. Currently magnesium is moving from Velasco, Texas to Midland, Michigan--mostly in pig form. Strapped in bundles

[1]U.S. Department of Interior, op.cit.
[2]The American Waterway Operators, Inc., op.cit.
[3]Innes, op.cit.

Fig. 78--Magnesium pig in Chicago enroute from Velasco, Texas to Midland, Michigan.

it is barged to Chicago, then transhipped to truck for final delivery to Midland. No tonnage figures are available at present but as a result of an increased war production the volume is steadily increasing.[1]

[1] Ibid.

C. AGRICULTURAL AND FOREST PRODUCTS, OTHER THAN FOODS

Introduction

Textile and other fibres provide the bulk of agricultural and forest products, other than foods, transported on the Illinois Waterway. Tung oil, cork, vegetable dyes and tannin extract are also of importance as is soybean meal. In 1949 more than 10,000 net tons of textile fibres moved north on the Illinois Waterway, but this made up less than one-fourth of the total northbound fibres, much of which was delivered at Memphis, Cairo, and Minneapolis. In the same year more than 1,000 net tons of vegetable dyes and quebracho, or tannin, extract were barged into Chicago.

Sisal

Sisal originating in Tampico, Mexico, and Havana, Cuba is transhipped from ocean vessel to barge at New Orleans for movement to Chicago. The main importer in Chicago is the International Harvester Company which uses it in its twine mill at 26th Street and Western Avenue, only a short truck haul from the Western Avenue docks of the North Pier Terminal Company.

The pattern of sisal traffic is expected to be changed by the construction of a new twine mill in New Orleans.[1] The reason given for a shift to New Orleans is that the areas of largest demand for twine are currently in Texas, Arkansas and to the northwest of Minneapolis. Therefore, Chicago is circuitous to the direction of sales.

---

[1]Moore, op.cit.

The current change in the location of twine markets and the kinds of binders used provides an illustration of the manner in which traffic patterns change. The demand for binder twine has been slackening. However, due to recent increases in the cost of baling wire, twine is being substituted for it. Therefore, instead of twine being trucked or railed only short distances from Chicago, it is now moving not only to midwest hay producers but to the west coast as well. This latter moves in part by barge. It also moves to many inland points such as Aberdeen, South Dakota on combined water-rail rates published by the Inland Waterway Corporation.

Jute

Another rough fibre of concern to the Illinois Waterway is jute. Although jute is not brought into Chicago by water, the use of the waterway to other destinations by a national manufacturer of bags illustrates the value of waterway transportation to Chicago firms operating producing plants throughout the country. Also, their operations provide an excellent example of the manner in which diverse mediums of transport can be profitably combined. The Bemis Bag Company of Chicago imports both jute twine and burlap from Calcutta, India. Due to a current shortage, there is usually a rush to unload jute from ocean freighters immediately after they dock in New Orleans in order to hurry its delivery to plants at Memphis, St. Louis, Peoria, Omaha and Minneapolis. However, because none of the factories can process a whole shipload at once, selected shipments are made by rail; the balance is then shipped by barge or rail-barge.[1] Thus, two functions are performed by this operation. Deliveries to plants are staggered and in-transit warehousing is provided for the balance

[1]Johnson, op.cit.

of the jute or burlap.[1]

Quebracho

Quebracho extract for tanning leather is barged into Chicago. In 1949 it totaled less than 1,000 net tons but the product is of more interest to Chicago waterway's operations than is indicated by the tonnage alone. The successful handling of quebracho through New Orleans presages shifts in port routings of other commodities such as coconut, cocoa beans, and other overseas products currently imported by Chicago firms through New York or other eastern ports.

Immediately after the mid-thirties quebracho began to be brought in via New Orleans, Mobile or Galveston. This resulted from a ruling of the Interstate Commerce Commission that rail rates from Boston and New York to various inland destinations were considered as 100 per cent and lower rates were established for less favorably located ports. Current rail rates on quebracho to Chicago, as a result of this ruling, are 85 cents from Boston and New York and 83 cents from the above listed Gulf ports. Before the ruling the quebracho rates were 45 cents from New York and Boston and 48 cents from southeastern ports on the Atlantic. Not until 1935 were rates published from Gulf ports.[2] Following this rearrangement of the import pattern of quebracho the barge-rail rate of 75 cents and barge rates of 73 cents were published. Also a special barge rate, 42 cents per hundred pounds for users of quantities of 300 net tons or over, has been established.[3] This rate advantage of 41 cents per hundred pounds should insure that quebracho extract will continue to be barged into Chicago.

---

[1] Ibid.
[2] Statement by A. J. Dittmer, Gutmann and Company, Inc., personal interview
[3] Ibid.

The location of processing plants in New York, such as those formerly leaching quebracho on Long Island, and those currently processing coconut oil, will provide economic resistance to a shift in certain commodity traffic patterns to other receiving ports. Gradually, however, plant depreciation will either require modernization or the construction of new plants. When the latter course has been decided upon, a shift to another port then becomes a possibility. At least one concern importing coconut oils is at present contemplating such a course.[1]

A shift in processing to the point of origin for a given commodity will have a similar effect. Early in the 1930's quebracho extractors began leaching at the sources of the quebracho in Uraguay, Paraguay and Argentina. Now it is exported in the solid form, similar to resin, in 110 pound bags. The bags are barged down the Rio Parana to Buenos Aires, loaded aboard ocean freighters and transferred again to barges upon arrival in New Orleans. The shift to overseas processing for quebracho by-passed the established leaching plants on Long Island, and this, combined with the rate advantages held by New Orleans, caused the shift in routing shipments to Chicago via that port rather than via New York. This appears to be a forerunner of changes in the ports to be used by Chicago importers for other commodities as well.

Other Agricultural and Forest Commodities

Other agricultural and forest commodities received in Chicago by barge are soybean meal, cotton waste, cork, tung oil, poles, pilings and posts. Soybean meal is distributed from Chicago for livestock feed. Cotton waste is used by the railroads and industries of Chicago for a wide range of applications. Cork, like-

[1]Statement by T. B. Thompson, Proctor and Gamble Co., personal interview.

wise, is used by many different kinds of factories from bottling works to flooring manufacturers. Tung oil is received and handled by the Lake-River Terminals in much the same manner as petroleum products. Much of the piling is used for port maintenance and mooring clusters at Chicago docks.

Little or no lumber is barged into Chicago. Although limited amounts of wood pulp, in baled form, are brought into Chicago by water, lumber is conspicuously absent from the list of water-borne commodities. This is in spite of the fact the waterway passes through Louisiana and Arkansas, one of the few large timber producing areas in the United States where growth exceeds the drain.[1] The reason for this current lack of lumber shipments is the marketing pattern and value of the product. Lumber is very widely distributed and therefore only relatively few lumber distributors could be located on the waterway. Furthermore, carloads of lumber are sufficiently large for the average lumberyard and few could handle bargeload quantities. In addition to the marketing pattern is the fact that lumber must be collected from widely dispersed mills. As a result it is usually more economical to ship lumber by carload directly from the mill to lumber distributor. The high value and short supply of lumber also favors as short an in-transit period as possible, especially after curing by kiln.

Summary

In summary it should be pointed out there are relatively few products--other than foods--from farm, plantation and forest moving by barge into Chicago. Potentially there are many. Tonnage-wise the total is also small, but the advantage of rate savings, staggered deliveries, and in-transit warehousing answer definite needs of the industries concerned.

---

[1]James W. Cruikshank, Southern Pulpwood Production and The Timber Supply, Southeastern Forest Experiment Station, Asheville, N.C., 1948, p.9.

D. FOODS AND BEVERAGES

Introduction

There is a long and varied list of foods and beverages carried in minor quantities to and from Chicago by barge. In addition to grains, previously discussed, food and beverage commodities range from canned, bottled or frozen foods in packages to bagged sugar and coffee, bulk bargeloads of sugar, and tankloads of syrup and molasses. The commodities range from raw foods such as grain or fish to highly processed foods such as specially ground flour, blended syrups, soups and other canned goods.

In spite of the great variety of foods and beverages transported by barge, only canned goods, coffee, sugar, and molasses are moved regularly in bargeload lots. All others are barged in less than bargeload lots and therefore their shippers depend on the government-sponsored Inland Waterway Corporation for their handling. Only occasionally are bargeloads of one kind of food or beverage, other than the above four types, shipped. When they are barged they are usually towed by either The Inland Waterway Corporation or the John I. Hay Company, both operators specializing in tows made up of mixed commodities.

Sugar and Molasses

Of the four types of foods and beverages forming sizeable waterway tonnages--coffee, canned goods, sugar, and molasses--the last two are best suited to barge traffic. All large sugar and molasses buyers in Chicago warehouse or store these commodities--so they must buy ahead. This kind of buying lends itself to slow-moving water transport. Also, great quantities are moved.

Annually, 150,000,000 to 200,000,000 pounds--or 75,000 to 100,000 net tons--of sugar move into Chicago by barge, a similar amount by rail.[1] Chain stores and sugar brokers handle 98 per cent or more of this total,[2] and their large organizations are able to receive and store or distribute such large shipments as bargeloads exceeding 800 net tons each.

Sources of the sugar and molasses used in Chicago are advantageously located in relation to the Illinois-Mississippi Waterway. Barges of sugar for Chicago originate in Cuba, Hawaii and Louisiana. Syrup and molasses come from Cuba and Louisiana. Overseas shipments are either transhipped directly into barges at New Orleans and vicinity, or are placed aboard barge after further processing in refineries there.

Currently, sugar is moved in 320-pound bags and molasses in special tank barges. Experimentally, sugar has been shipped loose in barges, as grain is handled, in order to take advantage of lower bulk rates. These tests have been conducted only since March 1951 and their success is not assured. However, the potential savings in shipping costs, especially as regards loading, unloading, and utilizing space aboard barge most effectively are considerable. It has been estimated the savings will amount to one-third of the current rate. Molasses was formerly shipped in drums but specially constructed steam heated barges have resulted in greater volumes per barge and year-around operations. A large degree of the flexibility possible when drums were in use has been maintained by installing pumps aboard barges making them self-loading and unloading.

The unloading of sugar in Chicago is concentrated at three main points. The John I. Hay Company terminal, The Western Avenue docks of The North

---

[1]Statement by C. D. Pflaum, George E. Kaiser Co., personal interview.
[2]Ibid.

Pier Terminal Company, and the General Warehouse and Forwarding Company, located at 18th Street and the South Branch of the Chicago River. From these three points sugar is sent by truck and rail to brokerage warehouses, chain store systems, candy companies, and soft drink manufacturers. There is nothing unique in its marketing as compared to that of sugar brought in by rail.

Molasses is unloaded chiefly at Lake River Terminals--at Harlem Avenue and the Canal. Here it is handled in much the same manner as petroleum products. Accounts and stocks are maintained and distribution is by tank car and truck. Molasses is used mainly in the manufacture of blending pellets for stock feed. Lighter syrups are handled in a similar manner; they are used for blending with maple syrup for commercial canning. Much of the lighter syrups and molasses will continue to be brought to Chicago by rail because of the smaller quantities needed by many users and a greater ease in redirecting them in transit.[1]

A considerable saving results in freight rates on sugar and molasses by using the waterway. Considering the Port of New Orleans as a source point, the lowest rate to Chicago is $5.61 per net ton on thousand-ton lots, which covers the movement from port to port, with stevedoring charges for loading at New Orleans and unloading at Chicago for the account of the shipper or consignee. This compares with $13.20 per net ton by rail and $13.10 by truck.[2] These rates apply to shipments in bags of 320 pounds. Bulk shipments by barge, as already pointed out, will result in a still greater disparity in rates.

Thus, there are both advantages and disadvantages to the shipment of sugar by barge. The main advantage of barge movements of sugar are: 1) the savings

[1]Pflaum, op.cit.
[2]Letter from Carl Lind, Lind Brokerage Co., December 2, 1950.

in freight rate, and 2) the fact that a buyer is in a position to take advantage of immediate shipment prices, and yet not have to take actual delivery of the sugar for three to five weeks. The main disadvantages are: 1) slowness of service for those buyers who are in a hurry for sugar, and 2) the irregularity of barge arrivals. One tow may make schedule time of three weeks, and the next one four or five weeks. This often means that barges leaving New Orleans spaced a week or ten days apart will arrive in Chicago at the same time. This creates serious problems for any user who requires a steady flow of sugar.

Coffee

Coffee importers frequently use the Inland Waterway Corporation and occasionally the John I. Hay Company for shipments from New Orleans to Chicago. In 1948, 17,109 net tons reached Chicago by barge,[1] in 1949, only 8,953 net tons.[2] However, from four to five times this last amount reached Chicago from New Orleans by barge and rail, having been transhipped in St. Louis. The coffee moves in bags weighing from 132 to 165 pounds. Coffee is shipped green and is roasted and blended after reaching Chicago. Some of that arriving in Chicago by rail is processed and packaged in transit at St. Louis.

Coffee clearly illustrates that water transport is best able to serve large organizations and is best suited to handle commodities low in value. In 1938, small brokers and distributors were able to ship green coffee by barge--green coffee could then be purchased in New Orleans for 22 cents a pound.[3] At present green coffee costs about 52 cents a pound in New Orleans. Therefore, the capital needed to invest in coffee enroute is more than double that required in

---

[1]The American Waterway Operators, Inc., op.cit.
[2]Department of the Army, Corps of Engineers.
[3]Statement by G. W. Kramme, Swanson Bros., personal interview.

1938. Companies operating with a relatively little capital find they can no longer tie up their funds for periods of three to five weeks--the time it takes for barge shipments. Rather, they must keep turning their available funds over at a faster rate, therefore, they must depend on rail. Larger companies, with more capital available, are better able to invest funds in large, relatively slow-moving barge shipments and take advantage of the rate savings. Barge-rail shipments via St. Louis effect a compromise between rate savings and time requirements. Currently effective rates from New Orleans to Chicago are as follows:

All Water Barge	54¢ cwt.
Barge-St. Louis, Rail, Chicago	58¢ cwt.
All Rail	65¢ cwt.

Thus, a savings of 11 cents a hundred weight is possible using all water; 7 cents a hundred weight is saved by shipping coffee by barge to St. Louis, and then rail from St. Louis to Chicago.[1]

In coffee, then, we see a commodity formerly ideally adapted to barge traffic now less suited for water traffic due to an increase in value. The danger is real that further increases in coffee prices will make waterway movements of it impracticable.

Canned Goods

Canned goods, in contrast to coffee and sugar and molasses, move in both directions by barge. Formerly, from 1946 to 1949, the preponderance of tonnages in canned goods consisted of southbound vegetables, meats and soups canned in Chicago. However, much of this traffic, some of it experimental in nature, has fallen to truckers. Trucks permit easier distribution for a product widely consumed, and eliminate much transhipping and terminal storage. Also,

[1]Letter from Perry W. Gates, Richheimer Coffee Co., January 11, 1951.

due to an increase in the value of many canned goods, they, as with coffee, are no longer adapted to barge traffic.

Canned pineapple is currently the chief type of canned goods moving by barge. It is shipped from the Hawaiian Islands and imported for the Chicago market through the Port of New Orleans. The chief advantage of this route is the rate savings, for it is much more time-consuming than steamer to San Francisco and thence rail to Chicago. The total cost in freight from the Hawaiian Islands to Chicago via San Francisco and rail beyond is $37.79 per net ton and the time in transit approximately 24 days. The freight costs, steamer from the Islands direct to New Orleans and barge beyond, is $34.50 per net ton with an in-transit time of 42 days.[1] Practically all canned pineapple is unloaded at the North Pier Terminal Company's Western Avenue docks for transhipment to rail and truck for movement to grocery brokers and chain stores.

Other Foods and Beverages

Other foods and beverages making up the total of those commodities shipped are numerous, but none of them account for outstanding tonnages. Imported beverages and malts, coca-cola syrups, and canned soups are examples. Others are beef concentrates that are shipped from South America to Chicago, and canned meats that are imported from Argentina, Uraguay, and Brazil.

In the past, companies shipping food items by barge were restricted because of transit time. The recently inaugurated express service of the Inland Waterway Corporation promises to relieve some of the disadvantages of the long in-transit period. Many large shippers have indicated they intend to experiment

[1]Letter from J. E. Garber, The Great Atlantic and Pacific Tea Company, January 15, 1951.

with barge shipments under the new schedule. It is too early to know what the final effect will be. There is no doubt, though, that if the experiment is successful, it will bring about important changes in barge operations and traffic patterns.

VI. OTHER COMMODITIES POTENTIALLY AVAILABLE FOR CHICAGO'S BARGE TRAFFIC

Introduction

Potentially there are many more commodities available to be added to those currently totaling Chicago's river-canal tonnages. Equipment and facilities are presently being constructed for some; others are still in the planning stage, and, no doubt, others are yet to be discovered. Many products will lend themselves to barge operations only after a certain set of conditions develop. Changes in the nation's total economy must precede some. Others will develop only after the economy has had to resort to alternate supplies of raw materials following the depletion of currently mined deposits. Waterway improvements are requisite before still other potential cargoes will be enabled to be moved by water. Shifts in the location of processing works, or the construction of new riparian factories, will result in still other new commodities for river carriers. Furthermore, each potential commodity must be studied with regard to areas of supply, to market areas of consuming plants and their facilities, as well as to size and types of transportation equipment that will be essential.

The potential barge commodities for Chicago that are discussed in this section are illustrative of some of the above possible developments. For instance, cement is an example of a commodity that needs only a slight change in the national economy, or specifically, in the demand of the Chicago market, before it will be added to the list of products currently carried northward on the Illinois Waterway.

The potential traffic of the waterway is also contingent upon the completion of other waterways that might be accessible to Chicago users. Some implications of the effects a modernized Hennepin Canal might have on Illinois Waterway traffic have been discussed in connection with grain, iron and steel. In regards to this canal there would be a noticeable increase in the annual total tons carried on the Illinois Waterway. The completion of the Saint Lawrence Seaway project would have an impact upon the Illinois water-route of equal importance. However, it would differ in its effect in that it would probably not increase the total tonnage carried on the Illinois but would decrease the number of different kinds of cargoes barged to Chicago. Relatively slight increases in the tonnage of coal, sand and gravel, petroleum and grain would likely be a result of increased trade and commerce effected by the advantages of a Saint Lawrence water-route to Chicago users. Especially should grain cargoes be considerably greater because additional shipments can be expected to be barged to Chicago for export. These gains in the four major commodities would be offset, at least in part, by decreases in imports transhipped to barge at New Orleans; for example, the freight rates on such cargoes as pig iron, and iron ore from northwestern Europe, and ferro-manganese from Turkey should be less if ocean vessels delivered them to docks in Chicago.

Cement

Of all potential commodities to be added to Chicago's barge traffic, indications are that cement will make up the greatest tonnage. Three of the six producing plants supplying Chicago are located only short distances from the Illinois Waterway, one at La Salle, Illinois and two at Oglesby, Illinois (fig. 79). All three of these plants currently use water transport for certain commodities;

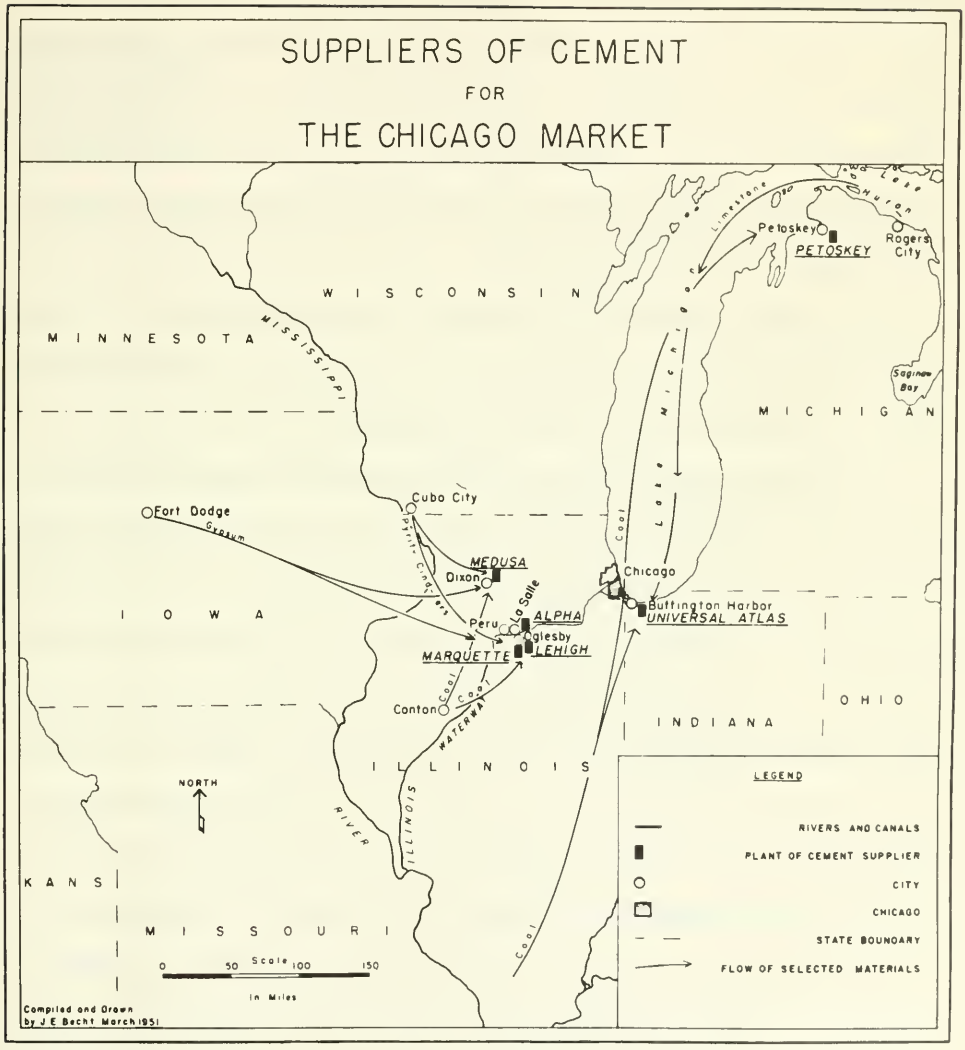

SUPPLIERS OF CEMENT
FOR
THE CHICAGO MARKET
WISCONSIN
MINNESOTA
MICHIGAN
IOWA
ILLINOIS
INDIANA
OHIO
KANSAS
MISSOURI
MISSISSIPPI
RIVER
Fort Dodge
Gypsum
Cubo City
Upper Canal
MEDUSA
Dixon
Peru
La Salle
ALPHA
Oglesby
LEHIGH
MARQUETTE
Canton
Coal
Coal
WATERWAY
Coal
Chicago
Lake Michigan
Coal
Limestone
Lake Huron
Petoskey
PETOSKEY
Rogers City
Saginaw Bay
Buttington Harbor
UNIVERSAL ATLAS
NORTH
0 50 Scale 100 150
In Miles
Compiled and Drawn by J E Becht March 1951
LEGEND
RIVERS AND CANALS
PLANT OF CEMENT SUPPLIER
CITY
CHICAGO
STATE BOUNDARY
FLOW OF SELECTED MATERIALS

Fig. 79

one of them actually barges cement to the south. At present these three factories are at a twenty-five to thirty cent rate disadvantage as compared to the Universal Atlas Cement Company kilns at Buffington Harbor, Indiana (fig. 79). However, due to the current demand for cement all of these producers are, for the present, assured of Chicago customers.[1] When demand slackens, or production exceeds all market requirements, competitive needs will force the La Salle-Oglesby companies to solve their current rate problem by meeting the lower competitive delivered prices in the Chicago market.

One solution appears to be in turning to water transportation. At present all three plants have nearby dock facilities. Two of them have retained riparian sites in the Chicago area, the third is negotiating for one.

The Chicago market uses approximately 4,000,000 barrels of cement annually which is shipped to Chicago at various rates.[2] Over one-half is supplied from Buffington Harbor, Indiana under a local switching rate of 22.5 cents per barrel for one-line hauls, 26.3 cents for two-line hauls, and 31 cents for three-line hauls. Truck costs from Buffington Harbor to Chicago range from 22 to 26 cents per barrel depending on the distance, and to this is added a truck loading fee of 15 cents per barrel.[3] Another 200,000 barrels reach Chicago ex-lake vessel from Petoskey at an approximate rate of 49 cents each barrel.[4] In round numbers, 1,500,000 barrels are shipped each year from the three plants at La Salle and Oglesby,[5] and another 200,000 to 250,000 from Dixon, Illinois[6] (fig. 79) all at a rail rate of 58 cents per barrel.[7] It is estimated the cost of

[1]Statement by Frank H. Cull, Alpha Portland Cement Co., personal interview.
[2]Statement by Vincent Kogge, Marquette Cement Co., personal interview.
[3]Statement by J. E. Christiansen, Universal Atlas Cement Co., personal interview.
[4]Computed at the rate of 9 mills per ton mile for a distance of 274 miles and 380 pounds per barrel.
[5]Kogge, op.cit.
[6]Estimated.
[7]Kogge, op.cit.

barging a barrel from La Salle to Chicago will be 26 cents.[1] To recapitulate the various rates in cents per barrel from various sources to Chicago are:

From	Rail	Truck	Lake	Barge
Buffington Harbor, Indiana	22.5 to 31.0	37 to 41	--	?
Petoskey, Michigan	--	--	49	--
Dixon, Illinois	58	--	--	--
La Salle, Illinois	58	--	--	26
Oglesby, Illinois	58	--	--	26

From these figures it can be determined that the rate advantage of plants supplying Chicago consumers by barge, as compared to the Universal Atlas Cement Company of Buffington Harbor would be reduced to less than ten cents. Furthermore, their riparian storage silos would be on the west side of the city, more centrally located with respect to the market.[2] Rate-wise, then, the locations of supplying plants to be most seriously affected by the advent of river-canal operations are Dixon, Illinois and Petoskey, Michigan. They are most likely to find it increasingly difficult to compete in the Chicago market during periods of lesser demand. It should also be pointed out that it is possible to ship cement from Buffington to Chicago by barge. This movement does not appear likely to develop because the distance is too short to realize enough savings to pay for requisite facilities.[3]

Production costs as well as rates affect the ability of any certain cement plant to compete for a specific market. In that respect the La Salle-Oglesby area has an outstanding advantage because it is more advantageously located with respect to requisite raw materials. All of the six factories are located at sources of limestone and shale, with the exception of the one at Buffington Harbor,

---

[1] Ibid.
[2] Cull, op.cit.
[3] Christiansen, op.cit.

Indiana, which was originally located so as to use slag from nearby steel mills--more and more, however, they have had to resort to the bringing in of limestone, some of it coming by lake vessel from points as distant as Rogers City, Michigan (fig. 79).[1] Coal is another important requirement, constituting a tonnage about one-third that of the processed limestone and shale. It is currently delivered to the La Salle-Oglesby plants by barge; the others obtain their supplies by rail or a rail-lake combination from relatively distant producing districts. Sources of gypsum and pyrite cinders are also advantageously available to La Salle-Oglesby. Gypsum supplies are obtained near Fort Dodge, Iowa and pyrite cinders are available in the vicinity of Cuba City, Wisconsin (fig. 79). Only Dixon is better located to receive rail shipments of these last two commodities. It should be emphasized that relatively small amounts of these are required, only some 35,000 tons of the two minerals are shipped to the La Salle and Oglesby plants annually.

The three plants, Alpha Portland Cement Company of La Salle and Lehigh and Marquette Cement Companies at Oglesby plan to reach river docks in different ways (fig. 80). None of the three is situated directly on the banks of the Illinois River. Alpha is the closest, only about one quarter of a mile distant, but separated by the main line of the Rock Island Railroad. Lehigh and Marquette are about two and one-half miles distant but at present use circuitous rail routes. These companies have considered the possibilities of using tramway, pipe line, belt conveyor, trucks and rail to reach the waterway. Trucks appear to be the cheapest means of reaching the docks[2] but this means would require the construction of either a costly railroad crossing, an underpass in the case of the Alpha plant, or a roundabout route to by-pass Oglesby in the case of the Lehigh and

---

[1] Ibid.
[2] Kogge, op.cit.


RELATION OF LA SALLE - OGLESBY CEMENT PLANTS
TO
THE ILLINOIS RIVER
LA SALLE
PERU
ALPHA
ROCK ISLAND and PACIFIC R.R.
CANAL
UTICA
MICHIGAN
Docks used by
Lehigh & Alpha
ILLINOIS
RIVER
AND
Docks planned by Alpha
B.&O.R.R.
Marquette Docks
VERMILION
OGLESBY
LEHIGH
MARQUETTE
I.C. R.R.
RIVER
North
Scale
0 1 2 3
In Miles
Compiled and Drawn
by J.E. Becht March 1951
LEGEND
Rivers
Canals
Railroads
Cement Plant
Operating Docks
Planned Docks
Cities

Fig. 80

Marquette plants. At present, the latter two use rail to dockside, and Alpha plans an overhead pipe line to silos on the river bank. Lehigh and Alpha currently receive only coal by barge, and that from docks in Peru (fig. 80).[1] Marquette, on the other hand, not only receives coal at their own docks on the Vermilion River but also ships cement by water to points south.[2]

Upon the completion of requisite dock facilities in Chicago and the La Salle-Oglesby area, and with a lessening of demand intensifying competition, it can be assumed that the cement destined for the Chicago market from that area will be shipped by barge. As previously stated, this currently amounts to 1,500,000 barrels or 325,000 net tons. In time, possible sales losses by the less advantageously located plants at Dixon and Petoskey would result in a minimum total of about 350,000 net tons being added to current Illinois Waterway tonnages.

Iron Ore

The threatened exhaustion of Lake Superior iron ores may force the iron and steel industries of the Chicago-Gary area to turn to other sources of supply. A search for an alternate supply does not mean that the Mesabi and other great ranges will become ghost regions because there are very extensive supplies of taconite, which by beneficiation processes, can be made available. However, there is a continuing search for new deposits of high grade ores for special smelting purposes. In fact, occasional bargeloads of high grade Swedish iron ores are imported by Chicago steel mills. Some of it is received by water via New Orleans, some directly by small tramp vessels via the Great Lakes. It may be that in the future these shipments, as well as high grade ore from other de-

---

[1]Cull, op.cit.
[2]Kogge, op.cit.

posits, such as those in Venezuela, will move to Chicago in increasing volume by barge.

In the event beneficiation of Lake Superior taconites proves exceedingly costly the lower grade iron ores of Iowa and Missouri may be mined for Chicago users. If this occurs, water transportation is advantageously oriented. The chief reason for this traffic not having developed is that the deposits are small and scattered. Therefore, up to the present, the task of collecting the ore in sufficient volume for barge operations has been far too costly. In time it may be profitable to turn to these "secondary sources" and even then only low-cost water transportation could enable them to compete with imported ores.

Iron ore serves to illustrate a raw material that may be considered for the present merely as a potential commodity for the Illinois Waterway. Increments may be slow and may even cease after a uniform annual tonnage of high grade ores from overseas is reached. On the other hand, whether or not domestic ores will eventually be barged to Chicago is problematical, but it should be considered as a possibility, however remote.

Automobiles and Agricultural Implements

As pointed out earlier, improvements in the waterway, especially in the Sag Channel, would add commodities to the traffic. This point is illustrated by prospects that the Ford and Mercury Companies would utilize the decks of petroleum barges to ship their assembled units if bridge clearances would permit. The transportation of new automobiles by water from one section of the country to another has been employed in late years as a means of cutting freight costs from factory to distributing points. Equipment and operational "know-how" already are available as cars and agricultural implements have been loaded at

Evansville, Indiana destined for Memphis since 1946.[1] Techniques for loading and unloading as well as dock facilities exist. Only adequate waterway improvements are needed before the assembly plants of Chicago can ship new cars by barge.

Coconut Oil

Some of the possible changes that will result in new commodities have already been pointed out. In the discussion of quebracho it was shown how a shift in the location of the leaching process altered the shipping route of tannin extract. It was also noted that a similar shift in the treating of coconut oil might place it within the total pattern of Chicago's barge traffic. Reference has already been made to the construction of chemical plants along the Louisiana and Texas Gulf coast and to the volume and variety of the products shipped by barge from there. Also, the recent construction of riparian chemical works in Chicago clearly demonstrates how new riparian construction may result in future waterway users.

Salt

Still another form of potential traffic is that made up of emergency shipments. This is the manner in which the Morton Salt Company of Chicago uses the Illinois Waterway. They regularly bring salt into Chicago from Port Huron, Manistee, and Detroit, Michigan by lake vessels. If their winter stockpile becomes too low to assure continued plant operation until the navigation season opens on the Great Lakes, the Morton Salt Company will substitute salt from producing plants at Weeks, Louisiana or Grand Saline, Texas.[2] Ordinarily,

---

[1]The American Waterways Operators, Inland Waterways--Facts and Figures, Washington, D. C., 1950, p.34.

[2]Statement by A. B. Costello, Morton Salt Co., personal interview.

these points ship locally in their part of the country, St. Louis marking the northern edge of their distribution area. In an emergency they shipped one bargeload in 1949, none in 1950.[1] The chief reason for this irregular use of the Illinois Waterway is the rate difference. The barge rate is about $1.00 a net ton, the cost by lake vessel between 50 and 60 cents per net ton. Therefore, it is more economical rate-wise to bring salt into Chicago by barge only when occasioned by emergency.

Lead

Combinations of influences affecting water transportation may work together resulting in repeated changes in the traffic pattern. Or, it may be that a sequence of developments will result in a commodity being transported by barge for a period and then revert back to a potential status when still another event occurs. For instance, upon the completion of the Intracoastal Canal system from Corpus Christi to Brownsville, Texas in June 1949, the John I. Hay Company established a rate on lead of $11.11 per net ton, minimum 500 tons to the barge, from Brownsville to Chicago.[2] As a result, more than 6,000 tons of lead from Monterey, Mexico moved via Brownsville to Chicago from August 1949 through May of 1950.[3] Formerly, lead had been handled by rail carriers through El Paso and Laredo, Texas under a rate of $15.79 per net ton.[4] In response to the shift to barge traffic a trainload rate of $11.11 per net ton was proposed only on the lead moving from Brownsville to Chicago.[5] On the surface it would appear to

---

[1] Ibid.

[2] W. Y. Wildman, Abstract of Testimony Before The Interstate Commerce Commission, I. and S. Docket No. 5796, Sept. 1950, p.4.

[3] Hamby, op.cit.

[4] Wildman, op.cit.

[5] Ibid.

be a fair adjustment of rates, but, as the barge rate had been intended to apply from "on dock" or in railroad cars alongside dock "at Brownsville to destinations in the Chicago Switching District", it had not included switching costs from the International bridge to Brownsville. There is a switching fee assessed of $25.92 per car on rail shipments of lead from Mexico to Brownsville for exportation or transhipment. This fee is not added to the rail rate. Therefore, the advantage lies with the rail carriers and, if the proposed rail rate is allowed by the Interstate Commerce Commission, this commodity will cease to be moved by barge from Brownsville to Chicago. Another disadvantage that would preclude barge if rates were equal is that rail transit time to Chicago is only seven days as compared with an average of six weeks by barge. Lead, then, is an example of how a given commodity may drop from the pattern of Chicago's barge traffic.

Summary

In brief, the ebb and flow of barge traffic in response to resource disposition and trade requirement is influenced by many factors. It has been pointed out that barge transfer costs vary due to changes in rates, routes, port facilities, equipment, competition, national or local economies, depletion or discovery of mineral deposits, technological improvements, plant construction, relocation of processing works, volume and contracts entered into. These are the influences that have determined Chicago's present river and canal traffic and will determine which of the many potential commodities may, or may not, eventually be handled by barge.

VII. GEONOMIC IMPLICATIONS OF THIS STUDY

Introduction

Conclusions resulting from this study of commodity origins, traffic, and markets accessible to Chicago via the Illinois Waterway fall into four groups. Included in the first group are some disadvantages and advantages inherent in the river-canal transportation available to Chicago shippers. These lead to a second, the recognition of certain principles of transportation that determine the character of traffic on the Illinois Waterway. A third type provides indications of traffic potential on the Illinois Waterway; and, a fourth is the generalization of market and supply zones accessible to Chicago via the Illinois Waterway. Some of these conclusions may already be well known and this paper serves to test and validate them--others may not have been widely recognized. In any event, their inclusion has served to illustrate their significance to Chicago shippers.

Disadvantages and Advantages of Barge Traffic To Chicago

The total tonnage of barge traffic on the Illinois Waterway, as well as the variety of commodities carried, is limited by important disadvantages. In comparison with other media of transportation, barge movement on the Illinois Waterway is too slow and subject to too many schedule irregularities for many cargoes. The fact that the waterway has only one set of locks at each of the dams which maintain the nine-foot channel means that the waterway lacks an alternate route in case of lock congestion, lock damage, or necessary closing of locks for

repairs. Also, the waterway is subject to seasonal navigational difficulties that result in periodical irregularities in transport services. Added susceptibility to cargo damage, as contrasted with rail, has precluded many manufactured products from river-canal traffic. However, new dock facilities and transport equipment may result in improved service in this regard. A great disadvantage to waterway shippers is the fact that the waterway lacks sufficient flexibility to service plants over a broad area. It is only because these combined disadvantages are outweighed by certain advantages in the case of specific commodities that the current waterway traffic exists.

The advantages of barge transport to Chicago users are both direct and indirect in their effect. One of the most direct benefits to barge shippers in both supply and market areas is freight rate savings between diverse but complementary resource and market areas. This savings is effected not only through lower tariffs but the very existence of the waterway imposes rate ceilings on other transport media for certain commodities. A relatively long in-transit time for barge cargoes is a direct advantage in the case of selected commodities. In this connection staggered plant deliveries are made possible by using barge in combination with other transport media. Other direct benefits accrue to those waterway users that barge materials from areas not economically reached by any other form of transportation. Also, other waterway users find that actual waterfront construction, such as bridges, dams, and terminals, is facilitated by bringing materials by barge to the point of construction. In part direct, and in part indirect, is the advantage that lower transport costs are often reflected in lower plant production costs and this, in turn, makes possible the broadening of market and supply areas.

Less direct in their effect on the economy of Chicago and the nation, and certainly less tangible, are numerous advantages in the very existence of the waterway. In times of emergency the Illinois Waterway provides an alternate routing for shipments that would otherwise move by lake vessel and this provides a fuller use of the nation's total resources during periods for defense mobilization. Of further importance to Chicago's economy is the fact that some industries using large volumes of certain bulky materials are attracted to the Chicago area. From the highly selective manner in which the disadvantages and advantages of barge transportation have shaped the character of traffic on the Illinois Waterway certain principles have been determined.

Conclusions That Lead To Principles of Transportation That Determine The Character of Traffic on the Illinois Waterway

Conclusions concerning principles that shape the Illinois Waterway traffic pattern show some of them possess characteristics which are common to other forms of transportation. Certain other principles are unique in the influence they exert on inland waterway traffic. Some principles which have been demonstrated to be currently determining barge traffic to and from Chicago and which are common to other kinds of transport are the following. First, the greatest savings can be effected in low value, bulky commodities moving in volume. Second, the long haul is the most efficient. Third, terminals are most efficient when integrated with the plant process. Principles that have been concluded to be unique to barge traffic are: 1) Carriers do not find it profitable to serve other than large volume shippers. 2) Periods of high commodity demand depress general barge traffic. 3) The volume of traffic that barges are economically capable of handling is greater than that of either railroads or trucks for certain products.

4) Water transportation for several specific commodities is more likely to be used for intra-corporation shipments than inter-corporation traffic during "boom periods" in the nation's economy. 5) In the case of specific commodities the warehousing function provided by the longer in-transit periods resulting from using barge transportation is the main criterion in determining the mode of transportation to be used for their movement.

Traffic Potential

Currently increasing rapidly, the traffic of the Illinois Waterway is potentially limited only by its present physical capacity to carry cargo. Total tonnages and ton miles can be expected to continue to rise in the near future, even though at a decreasing rate. Since the Illinois Waterway was officially opened to navigation as recently as 1935, existing records of annual tonnages extend over too brief a period to determine a satisfactory long-range mathematical trend. For this reason no attempt has been made to predict annual traffic totals beyond 1960. The most recent yearly increments are the largest (fig. 3). However, when the data are plotted semi-logarithmetically, it is noted that the rate of increase has already begun to level off (fig. 4). At what total the annual tonnage will cease to increase cannot be definitely determined.

Rather than computing future trends on the basis of the brief existing records, it was considered that a more satisfactory potential tonnage figure can be obtained by totaling estimates for each of the major commodities discussed. These were as follows:

Coal	12,000,000 net tons
Sand and Gravel	5,000,000 net tons
Petroleum	5,000,000 net tons
Grain	2,500,000 net tons
Iron and Steel	2,500,000 net tons
Sulphur	550,000 net tons
Cement	325,000 net tons
Chemicals	300,000 net tons
Paper	300,000 net tons
Total	28,475,000 net tons

To this can be added another 2,500,000 net tons based on the assumption that this will be the sum of the annual volumes of the miscellaneous products not included above and their annual increments together with new traffic. Thus, the estimated potential traffic on the Illinois Waterway would be 30,975,000 net tons, or more than two and one-half times that currently carried.

This estimate of potential traffic on the Illinois Waterway exceeds its calculated capacity. The Corps of Engineers has determined the practical capaicty of the waterway as 21,300,000 net tons.[1] Some of the carriers place its profitable operational capacity at less than 15,000,000 net tons.[2] In either case traffic on the Illinois Waterway appears destined to be limited far more by either its practical capacity or its economic capacity than by lack of potential goods to be carried or markets to serve. Unless the carrying capacity of the waterway is increased, the real problem will be the fair apportionment of available barge shipping. That shipping space can be allocated in a manner acceptable to all shippers and carriers concerned is highly doubtful. As pointed out in Chapter II, the chief factor limiting traffic capacity are the single locks at each of the dams. Therefore, unless additional locks are constructed in the near future barge shipments will gradually become less and less economical to both shipper and

---

[1] Alba, op.cit.

[2] The tonnage for 1950 exceeded 16,000,000 net tons--see appendix III.

carrier until its chief advantage, that of offering industry low-cost transportation on low-value bulky commodities moving in volume, will be lost.

Generalization Of The Market And Supply Zones Accessible To Chicago Via The Illinois Waterway

In general, there are two principal market and supply zones accessible to Chicago via the Illinois Waterway. They are 1) north and central Illinois and the St. Louis area of Missouri, and 2) the Louisiana and Texas Gulf Coast areas. These two are separated by approximately 1,200 miles, and in this separation lies both strength and weakness for barge operations. The distance favors the benefits accruing long-haul shipments but the fact that threr are few potential or actual commodities found between the two areas is an important handicap to river carriers. In the first zone, coal mines, riparian sand and gravel deposits, Wood River petroleum products and grain constitute by far the largest volume of traffic barged to Chicago. The same area is also one of the outstanding markets for river-borne commodities manufactured in Chicago. Petroleum products, and iron and steel articles make up the major share of this southbound commerce.

Southbound iron and steel articles are also the main types of water-borne goods marketed by Chicago industries in the second of the zones, the Gulf Coast market and supply zone. From this second zone are barged petroleum products, chemicals, sugar and molasses, and a large number of imported commodities. Insofar as coastwise and imported goods are transhipped into barges at New Orleans this is considered as a supply zone for traffic on the Illinois Waterway. Through the Port of New Orleans phosphates from Florida and paper from the west coast of the United States can be received by barge for Chicagoland users.

In the same manner overseas shipments of sugar and molasses, coffee, manganese, canned pineapple, and pig iron originate at New Orleans for barge shipment to Chicago.

In addition to the major traffic-generating zones there are four minor market and supply zones. They are: 1) Ohio River cities, 2) the upper Mississippi River, 3) Memphis on the middle Mississippi River and 4) the Tennesee valley. Iron and steel goods are the main commodity marketed. None of the four supply outstanding barge tonnages to Chicago. Limited quantities of iron and steel are shipped to Chicago from the Ohio valley, as are limited quantities of cotton waste from Memphis, and small tonnages of aluminum from the Tennessee valley.

Summary

The unique position of the Illinois Waterway, between important resource dispositions and the Chicago market, has resulted in barge movements of approximately 12,000,000 net tons annually. The character of the traffic included in this total is determined by disadvantages and advantages inherent in barge transportation. Although the estimated potential tonnage of commodities annually accessible to Chicago by barge is expected to exceed 30,000,000 net tons, annual increments will probably occur until the total yearly tonnage will be limited by the economic traffic capacity of the waterway which has been approximated at 15,000,000 net tons. In brief, this study of commodity traffic patterns indicates that market and supply zones accessible to Chicago via barge are able to generate a potential tonnage in excess of the capacity of the Illinois Waterway as it exists today.

APPENDIXES

I. WATER TRANSPORT EQUIPMENT

Some conception of the types and sizes of floating equipment in service on the Illinois Waterway is requisite to an understanding of traffic on that waterway. This is necessary in order to appreciate waterway capacity, service and operational difficulties. Above Lockport, and usually above Brandon Locks (fig. 2), towboats are limited in size because of narrow, crooked channels and the numerous low bridges, many of them fixed. The towboats using this upper section of the waterway range in length from 36 to 115 feet, in width from 11 to 28 feet, and draw from 5 to 8 feet of water. The silhouette of this vessel must be less than the 14 feet 10 inches which is the clearance of the Rock Island bridge over the Calumet Sag Channel. Hydraulically operated pilot houses are especially constructed for craft designed to work in the Chicago section of the Waterway (figs. 81 and 82). This enables them to pass under closed bridges. The horsepower of these vessels varies from 45 to 1200. The larger, more powerful towboats seldom are used above Brandon Road Lock. Due to the small tows of only three to four barges that are possible above Brandon Road Lock, these towboats are sufficiently powerful. A towboat 75 by 16 by 8 feet and of 360 horsepower is considered representative of these craft.[1] The number of these craft usually operating above Brandon Road Lock varies from 15 to 20.[2]

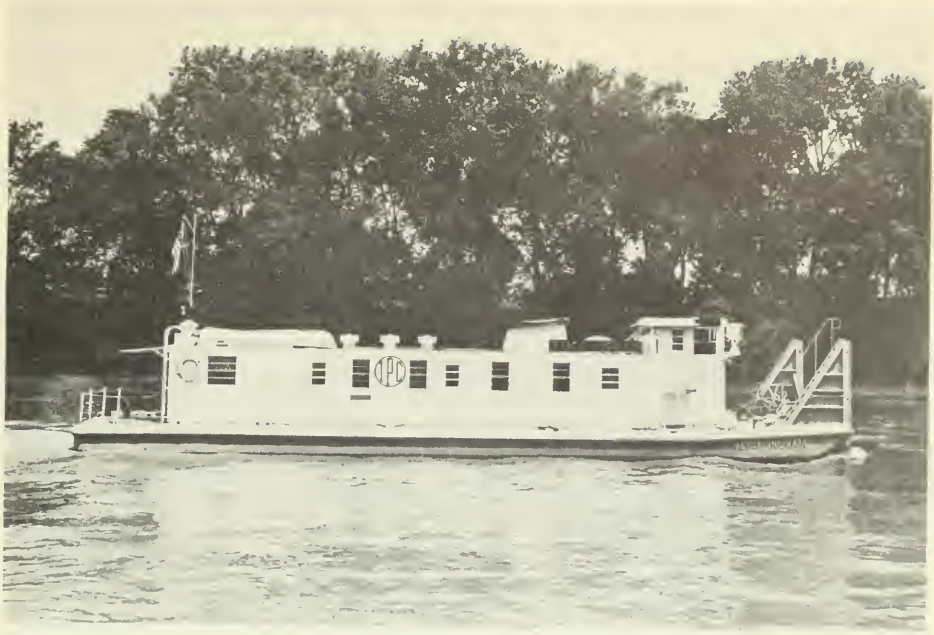
Below Brandon Road Lock some eighty to ninety towboats are operated.[3] The trend is toward larger, more powerful vessels to increase speed and size

---

[1]Statement of L. D. Alba, Corps of Engineers, U.S. Army, Chicago, Illinois, personal interview.

[2]Ibid.

[3]Ibid.



Figs. 81 and 82--Changing silhouette of towboat with hydraulically operated pilot house.--Courtesy Nashville Bridge Company.

of tows. The two most outstanding technological advancements that have made possible the modern river towboat are the diesel engine and electric arc welding. Both reduce weight and result in more propulsive power and speed (Fig. 83). The larger craft are approximately 165 feet in length, 35 feet in width

Fig. 83.--The "George T. Horton", newer type of large towboat, 4200 horsepower--Courtesy John I. Hay Co.

and they draw from 7 to 9 feet of water. In water over 12 feet deep they are capable of pushing 12,000 ton tows at an average speed of 7 to 8 miles per hour but during much of the year on the Illinois River they are limited to 3 to 4 miles per hour due to shallow water. With lesser loads average speeds of 10 to 11 miles per hour are possible.

In addition to more power, the newer vessels have greater operational flexibility and reliability. These are provided by radar, ship-to-shore radio

telephone, intercom and teletalk systems to various locations on the towboat and to the lead barge of the tow, electrically controlled searchlights, electric or hydraulic operated steering devices, and sounding devices that automatically record approaching water depths. All have resulted in a more reliable service. All have aided in overcoming uncertainties in navigation and have speeded up traffic control.

Various types of barges are available for specific types of commodities and commodity movements. Barges used for traffic on the Illinois Waterway range in size from 26 by 175 feet to 48 by 300 feet. Their draft is limited to $8\frac{1}{2}$ feet. Capacity of barges vary from 800 to 1,000 tons for the small "standards" to 3,000 tons for the largest "jumbo". Many shippers request smaller barges due to plant limitations, for it requires a large company to provide facilities for 1,000 tons of almost any commodity. The "jumbos" are preferred for downstream and are used sparingly in Chicago waters.

Barges are constructed to serve one of three classes of commodity; they are: 1) dry bulk, 2) liquid bulk, and 3) general cargo. The first type, dry bulk, ranges in design from one hopper, or box, units for transporting sand or coal to a multiple hopper type with permanent or portable tops for carrying grain; specialized barges, such as those designed for the movement of cement carrying 8,000 barrels of cement, or just over 1,800 tons, are also available (fig. 84). These cement barges, 35 by 195 by 11 feet, are equipped with self-unloading devices. The most modern method of unloading cement is a combination of cable-borne scrapers that deliver it to a hopper at one end of the barge and a pneumatic pump which moves it from the hopper into silos at the rate of 450 barrels per hour.[1]

[1]Statement by Vincent Kogge, Marquette Cement Corporation, Chicago, Illinois, personal interview.

Fig. 84.--Self-unloading, raked bow cement barges. Capacity 4,500 barrels each.--Courtesy Marquette Cement Co.

Specialized barges for transporting liquids are constructed according to the commodity for which their use is intended. High speed integrated petroleum barges (fig. 85), industrial alcohol units (fig. 86) as well as barges with rubber-lined tanks for sulphuric acid, and those with steam heating facilities for black strap molasses are available. Liquid chlorine, benzol, and methanol also require specially designed equipment. These have been built of single-skin, double-skin, or independent tanks. These tank units vary in capacity from the older conventional types of 9,000 barrels to those with volumes of 15,000 to 20,000 barrels which have been recently adopted for fleet operations.[1] General

[1]Letter from Commercial Petroleum and Transport Company, Houston, Texas, December 7, 1950.

Fig. 85.--Integrated high speed petroleum tow passing under State Route No. 18 bridge at Henry, Illinois--Courtesy Commercial Petroleum and Transport Company.

cargo barges also vary in capacity from 800 tons to 3,000 tons. Those in the foreground of fig. 86 (page 202) have a capacity of 1,500 tons and have dimensions of 45 by 195 by 11 feet.

Fig. 86.--Mixed tow in Brandon Road Pool over 700 feet in length; it is made up of nine barges. The two covered barges in the immediate foreground are "jumbos" carrying semi-finished steel, two in the right foreground are specially constructed for alcohol. Front right are two 19,000 barrel petroleum barges, left lead barge is an 8,000 barrel tanker. Two standards in between are filled with steel products.

II. MAP DATA

Figure 1. Water Routes Accessible To Chicago Via The Illinois Waterway
Base Map: American Barge Line, Inc. Through Route Service, 3rd Revised Edition 1948.
Cities: Added by inspection.
Waterway Mileages: Computed from Inland Waterways Mileages, Canal Barge Company, Inc., New Orleans, Louisiana.

Figure 2. The Illinois Waterway
Base Map: Outline Map of Illinois.
Cities and Locks: Added by inspection.

Figure 9. Waterways of Chicago
Base Map: Lake Front, Chart No. 751, Corps of Engineers, U.S. Army, Chicago, Revised 1947.

Figure 15. Relation of Chicago Waterways To Industrial Development
Base Map: Zoned Industrial Lands of Chicago, Chicago Regional Planning Association, Chicago, Illinois, 1950.
Waterways and Industrial Plants Using Barge Transportation: Added by inspection.

Figure 17. Multiple Commodity Terminals of Chicago Waterways
Base Map: Same as Figure 9.
Terminals: Added by inspection.

Figure 24. Relation of Illinois Waterway To Illinois Coal Districts
Base Map: Shipping Coal Mines, Illinois State Geological Survey, Urbana, Illinois, September 1, 1947.

Figure 25. Illinois Coal Rate Pattern From Fulton-Peoria District
Outline map of Illinois.
Rate Data: Published rail tariffs to county seats.
Isophors located by interpolation.

Figure 26. Illinois Coal Rate Pattern From Springfield District
Map Data: See Figure 25.

Figure 27. Illinois Coal Rate Pattern From Southern Illinois District
Map Data: See Figure 25.

Figure 28. Relation of Illinois Waterway To Illinois Coal Production
Base Map: County Outline Map of Illinois, McKnight and McKnight, Bloomington, Illinois.
Production Data: Illinois State Department of Mines and Minerals, 1943-1947 averages by counties.

Figure 38. Chicago Terminals of Barged Coal
Base Map: Same as Figure 9.
Terminal Data: Added by inspection.

Figure 41. Sources of Sand and Gravel Barged to Chicago
Base Map: Outline Map of Illinois.
Sand and Gravel Data: Preliminary Lock Records 1950, Corps of Engineers, U.S. Army.

Figure 42. Selected Building Material Yards of Chicago
Base Map: Same as Figure 9.
Material Yards: Added by inspection.

Figure 47. Relation of The Illinois-Mississippi Waterway To Petroleum Sources in Central United States
Base Map: Outline map of The United States
Location of Refineries: Oil and Gas Journal, March 23, 1950, p. 304.

Figure 53. Riparian Oil Terminals of Chicago
Base Map: Same as Figure 9.
Oil Terminals: Added by inspection.

Figure 54. Distribution Zone of Petroleum Products Barged Into Chicago
Base Map: Outline Map of The United States
Distribution Data: Based on the differences between group three basis and rail, or truck, rates.

Figure 57. Grain Elevators Along The Illinois Waterway
Base Map: Outline Map of Illinois
Grain Terminals: Added by inspection.

Figure 59. Corn, Wheat, Oats, Soybeans--Yield Per Acre (Average For Total Area by Counties)
Base Map: Photostatic enlargement of County Outline Map of The United States. U. S. Department of Agriculture, Washington, D.C.
Grain Yields: Computed from State Agriculture Department Statistics and U. S. Census Data for 1948.

Figure 60. Chicago Barge and Rail Grain Rates 1950
Base Map: Same as Figure 59.
Rate Data: From pertinent published tariffs in December, 1950. See footnote, Chapter IV, p. 117.

Figure 64. Network of Roads About Selected River Grain Elevators
Base Map: State Highway Map of Illinois, Springfield, Illinois 1948.

Figure 65. Waterfront Elevators of Chicago
Base Map: Same as Figure 9.
Elevators: Added by Inspection.

Figure 69. Source of Grain Transported To The Chicago Market By Barge, 1950
Base Map: Same as Figure 59.
Grain Source Data: See Chapter IV.

Figure 70. Overlays of Figures 60, and 69 on base of Figure 59.

Figure 72. Chicago Shippers of Iron and Steel On The Illinois Waterway
Base Map: Same as Figure 9.
Iron and Steel Shippers: Added by inspection.

Figure 79. Suppliers of Cement For The Chicago Market
Base Map: Outline Map of the United States.
Plant and Raw Materials Data: Located by inspection.

Figure 80. Relation of La Salle-Oglesby Cement Plants To The Illinois Waterway
Base Map: United States Topographic Quadrangle, La Salle, Illinois.

III. SUPPLEMENTARY STATISTICS

Principal Items of Traffic On The Illinois Waterway 1950*

	Tons
Bituminous coal and lignite	5,638,524
Sand and gravel, crushed rock except limestone	2,639,504
Motor fuel oil and gasoline, including blending agents or anti-knock compounds of petroleum origin	2,234,473
Corn	1,666,396
Gas oil, and distillate fuel oil	796,542
Residual fuel oil (including bunker oil)	722,741
Iron and steel	606,055
Sulphur	498,423
Kerosene	333,945
Wheat	140,339
Industrial chemicals, except sulphuric acid	113,351
Oats	102,733
Sugar	98,571
Petroleum products, n.e.c.	56,450
Paper, related products and manufactures including newsprint	54,682
Building cement	50,706

*Data are Preliminary and Subject to revision in the Annual Report Chief of Engineers, Part II 1951.

Total Tonnages Carried On The Illinois Waterway
1941-1950*

Year	Vessel	Through Traffic Via Chicago River, South Branch	Through Traffic Via Calumet Sag Channel	Total	Passengers
	Tons	Tons	Tons	Tons	Numbers
1941	6,559,850	121,835	53,972	6,735,657	162,785
1942	6,698,135	84,836	7,070	6,790,041	----
1943	6,372,548	47,156	25,669	6,445,373	----
1944	7,677,477	60,894	65,206	7,803,577	----
1945	6,461,107	73,810	56,022	6,590,939	----
1946	6,849,284	52,619	11,818	6,913,721	18,451
1947	10,110,468	51,502	3,323	10,165,293	14,643
1948	12,169,132	31,308	72,505	12,272,945	12,001
1949	12,614,278	51,191	229,645	12,895,114	10,062
1950	16,087,877	83,781	297,160	16,420,619	7,502

*Data are Preliminary and Subject to revision in the Annual Report Chief of Engineers, Part II 1951.

Direction Of Illinois Waterway Traffic - 1950

Recapitulation*

	Tons	Ton Miles
Imports, Canadian	55,140	48,244
Exports, Canadian	66,596	314,925
Imports, Overseas	1,543	7,406
Coastwise Receipts (via New York State Barge Canal, Oswego)	6,025	16,870
Internal Shipments (via New York State Barge Canal, Oswego)	270	3,847
Internal Receipts	144,889	14,522,972
Internal Shipments	3,708,916	412,715,828
Up-Bound	6,010,890	860,682,801
Up-Bound (In-Bound)	4,089,719	1,071,031,594
Up-Bound (Through)[1]	197,691	64,701,162
Down-Bound	608,902	17,889,576
Down-Bound (Through)[1]	183,250	59,986,979
Down-Bound (Out-Bound)	1,122,576	231,461,472
Local (Up-Bound)	1,405	7,025
Local (Down-Bound)	222,807	935,980
Grand Total	16,420,619	2,734,326,681

[1]Includes 83,781 tons of "Through Traffic" which passed over the South Branch of the Chicago River. The balance of 297,160 tons passed over the Calumet-Sag Channel.

*Data are Preliminary and Subject to revision in the Annual Report Chief of Engineers, Part II 1951.

Chicago Receipts of Grain and Soybeans
(1,000 bushels) January thru October, 1951*

Commodity	Rail	Barge	Truck	Lake	Total
Wheat	11,981	1,352	1,280	620	15,233
Corn	63,490	31,513	2,295	---	97,298
Oats	10,282	3,012	137	13,123	26,554
Rye	4,076	2	312	566	4,956
Barley	11,295	---	1	---	11,296
Soybeans	10,603	4,433	1,567	---	16,603
Total	111,727	40,312	5,592	14,309	171,940

*Board of Trade of the City of Chicago, Transportation Department.

SELECTED BIBLIOGRAPHY

American Petroleum Institute. Petroleum Facts and Figures. New York, 1947.

Ashton, Bessie L. The Geonomic Aspects Of The Illinois Waterway. University of Illinois Studies In The Social Sciences, Vol. XIV, No. 2, Urbana, Illinois, 1927.

"Barge Lines Profit Bound". Business Week. December 13, 1947, p.40.

Brown, D. I. "Rail Rate Raises Chase Midwestern Shippers To The Illinois Waterway". Iron Age, Vol. 161, May, 20, 1948, pp. 119-121.

Cady, Gilbert H. Analysis of Illinois Coals, Illinois State Geological Survey, Urbana, Illinois, 1948.

Campbell, J. P., Lt. Col. "Great Growth Noted On The Illinois". Waterways, June 1950, pp. 101-107.

Dixon, Harry M. "The Illinois Coal Industry". Unpublished Ph.D. dissertation. Department of Economics, University of Illinois, 1951.

"Freight Traffic Moved On Inland Waterways Set Record In 1948". Iron Age. Vol. 163, February 3, 1949, p. 188.

Goettler, W. "Buyers and Shippers Are Finding Economies In Greater Use of Inland Waterways". Purchasing, Vol. 4, January 1948, pp. 115-118.

Gregg, Eugene Stuart. Great Lakes-to-Ocean Waterways, U. S. Dept. Of Commerce, Transportation Division, Washington, D. C., 1927.

Hamrick, Nina T. "The Illinois Waterway". Current Economic Comment, Vol. 12, February 1950, p. 24.

Horton, C. R., Jr. "River Transportation Development", World Petroleum, February 1950, p. 40.

Illinois Post-War Planning Commission. Illinois Resources, Chicago, Illinois, 1946.

Interstate Commerce Commission. Ex Parte No. 165, Problems In The Regulation of Domestic Transportation By Water, Washington, D. C., 1946

Interstate Port Handbook. Chicago, Illinois, annually.

"Money For I.C.C. Highways and Federal Barge Lines". Railway Age, Vol. 127, September 3, 1949, p. 435.

Norton, L. J. "Developments In The Transportation of Illinois Grain". University of Illinois College of Agriculture, Urbana, Illinois, 1948 (mimeographed).

The Official Guide of The Railways. National Railway Publication Co., New York, April 1950.

Chemicals In The Texas Gulf Coast. South Texas National Bank, Houston, Texas, 1950.

U. S. Army, Corps of Engineers, Annual Report, Chief of The Engineers, Washington, D. C., annually.

_____, Illinois Waterway Navigation Charts, Chicago, 1939.

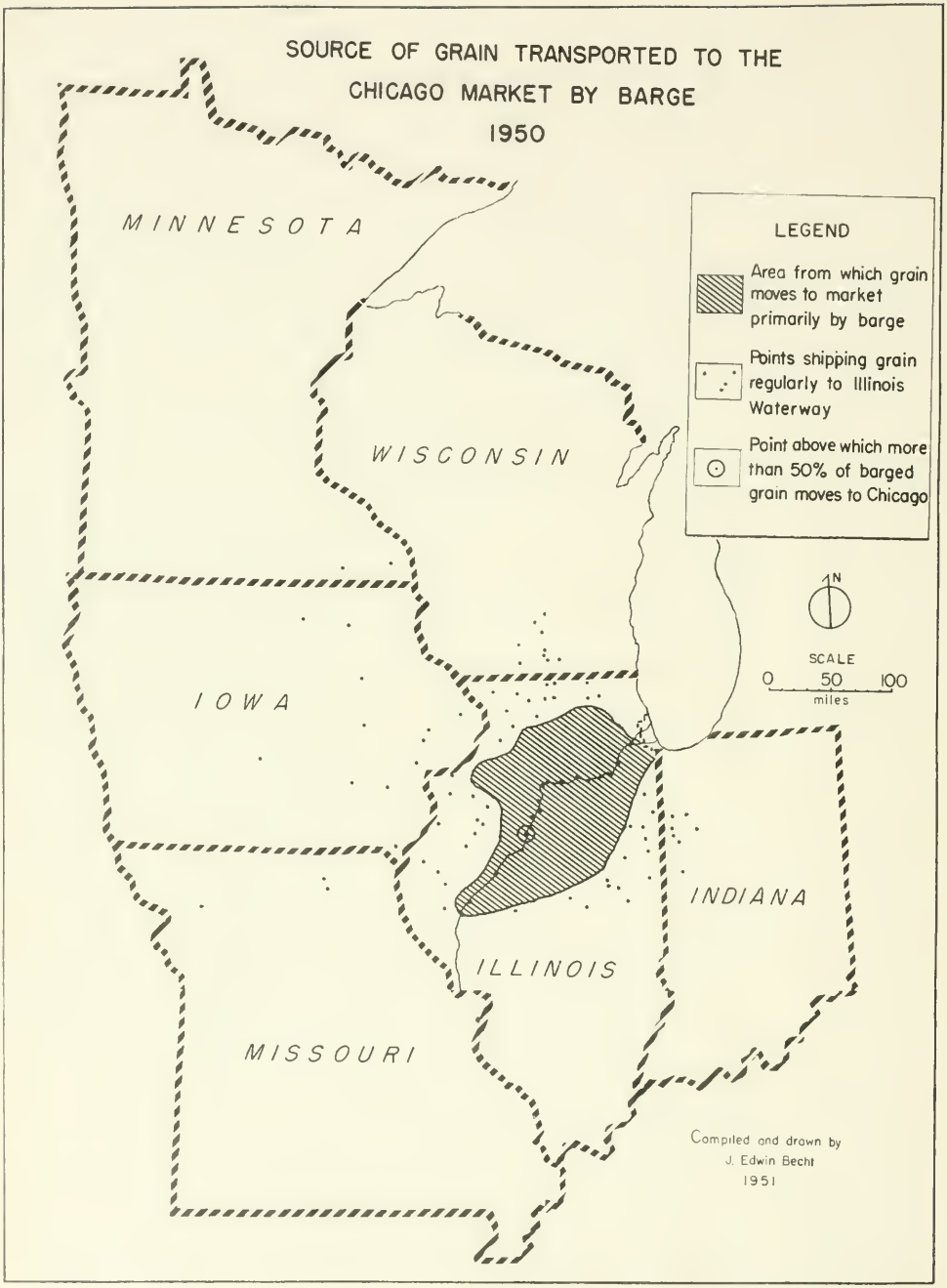
_____, Record of Public Hearing--Duplicate Locks--Illinois Waterway, Chicago, Illinois, August 1949.

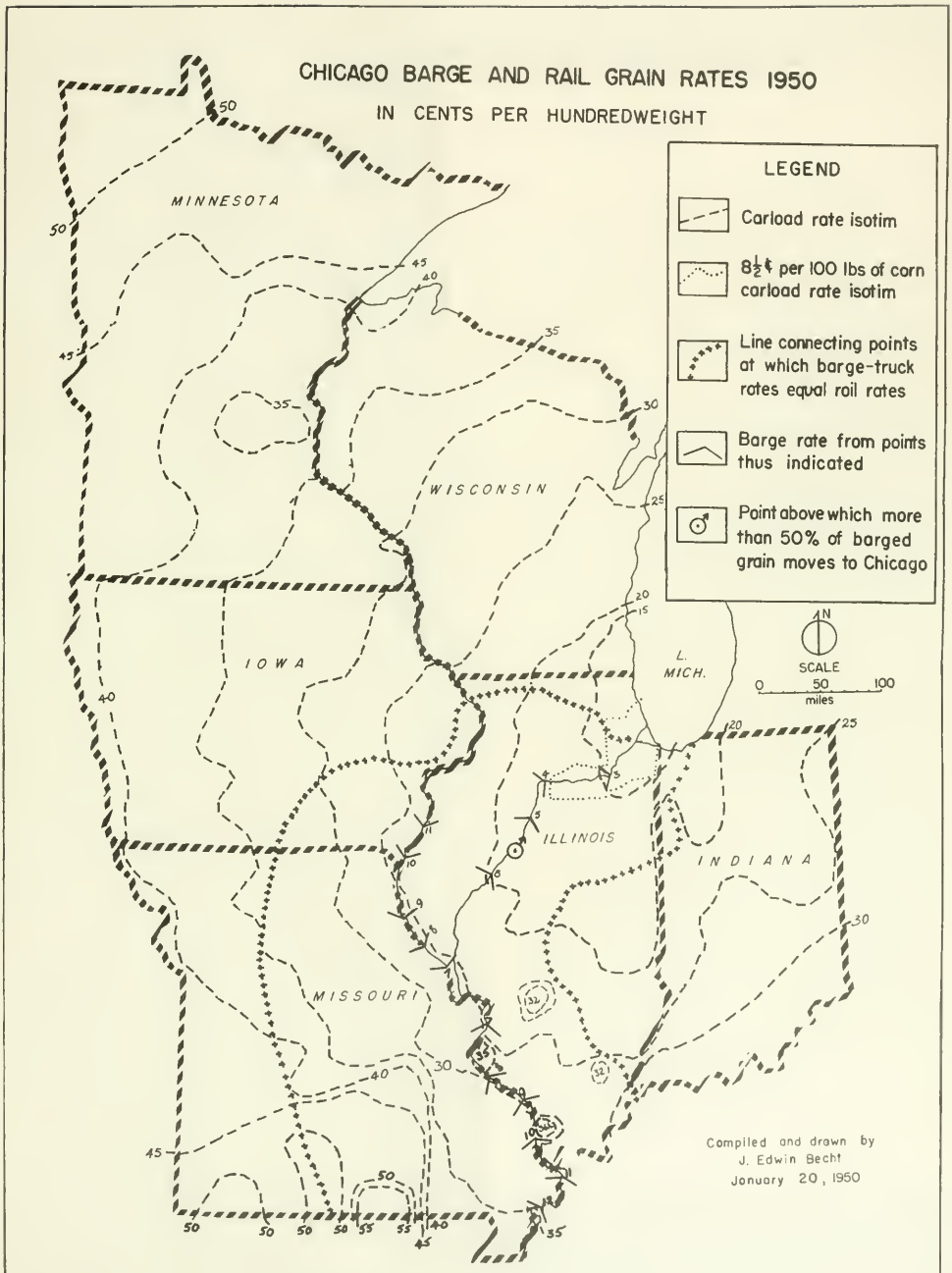
Voskuil, Walter H. Bituminous Coal Movement Into Chicago 1942. Illinois State Geological Survey, Urbana, Illinois, 1942.

_____, The Competitive Position of Illinois Coal in the Illinois Coal Market Area, Illinois State Geological Survey, Urbana, Illinois, 1936.

Warren, D. "Improvement of Waterways Boosts Tonnage Moved On Mississippi River". National Petroleum News, Vol. 41, July 27, 1949, pp. 675-88.

Young, Hugh E., Pihlfeldt, Thomas G., Oettershagen, Martin. Waterway Developments, Barge Terminals and Bridge Clearances. The Commission of Public Works, Chicago, Illinois, 1933.


SOURCE OF GRAIN TRANSPORTED TO THE
CHICAGO MARKET BY BARGE
1950
MINNESOTA
WISCONSIN
IOWA
ILLINOIS
INDIANA
MISSOURI
LEGEND
Area from which grain moves to market primarily by barge
Points shipping grain regularly to Illinois Waterway
Point above which more than 50% of barged grain moves to Chicago
N
SCALE
0 50 100
miles
Compiled and drawn by
J. Edwin Becht
1951


CHICAGO BARGE AND RAIL GRAIN RATES 1950
IN CENTS PER HUNDREDWEIGHT
LEGEND
Carload rate isotim
8½¢ per 100 lbs of corn carload rate isotim
Line connecting points at which barge-truck rates equal roil rates
Barge rate from points thus indicated
Point above which more than 50% of barged grain moves to Chicago
MINNESOTA
WISCONSIN
IOWA
L. MICH.
ILLINOIS
INDIANA
MISSOURI
N
SCALE
0 50 100
miles
Compiled and drawn by
J. Edwin Becht
January 20, 1950

CHICAGO BOARD OF TRADE
GRAIN RATES 1850